The Chemical Age

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Notes and Comments

Cancer and Common Salt

OUR excessive use of common salt has been held by some to be provocative of cancer—almost everything in turn has been so regarded. That salt should be made into a cure for cancer will be a surprise to those who are of this school of thought. It all comes of playing at skittles with the atoms—the game introduced by Lord Rutherford and played with such remarkable results by the school of elementary house-breakers he has brought into being. According to a notice in " The Times " of August 24, Professor E. Lawrence, of the University of California, had told the American Chemical Society, the day before, at San Francisco, that he is producing minute quantities of *Radiosodium* from salt, and that it should shortly be available for use, in place of radium, for the treatment of cancer. The objection to radium is its horrible longevity, a half-life of a mere 1,700 years: once introduced, to get rid of it is impossible. The half-life of radio-sodium is only 15 hours, so that it can be injected without fear of any destructive action it may cause going too far. The method of manufacture is to submit salt to a very high voltage electrical discharge. Such transmutation of a grain of salt by the discharge, as it were, of a big thunderstorm, is the reverse of the process visualised by the Jew, who thought when a severe storm came on that it was due to his use of " a little bit of pork." Big machinery will be needed, but the cost is estimated as likely to be far less than that of real radium. Professor Lawrence's medical colleagues, we are told, think it is possible that the discovery will ultimately be of greater importance to medicine than the discovery of natural radio-activity has been. Incidentally, we may say we should like to be told what this result has been. The statement is one that may well lead us to ask whether radio-activity of any kind be the right method of approach to the treatment of cancer.

The medical profession seems to have but one idea, that of curing disease; if disease were prevented, it would have little to do. The profession has had no greater enemy than Pasteur. By showing that infectious disease is due to micro-organisms and that these may be kept away by sanitary precautions, he has deprived it of much of its business. It is true, he made surgery possible and highly profitable by so doing and that he also gave a lift to the use of preventive and curative sera, but the loss on the sanitary swings has been greater than any gain on these other roundabouts. Medical men have too long based their practice upon Pasteur; the public is beginning to see that they have lavished attention too much upon morbidity and pathology. Fortunately, the chemist is once more coming forward to lead them and point out better ways of action: he would make them a new service of " Preventives "—a body of Health Guards. We have to look at cancer from this point of view—its origin is more than obscure: at least there is a probalibity that it is favoured, if not engendered, by malnutrition. A wide attack has to be made upon the problem on this assumption—a new class of highly skilled detectives has to be specially trained for the service. As to its cure, workers seem to have little imagination; they have used radium very loosely. In some cases, we know the effect it has is most remarkable: out-growths soon disappear and a normal appearance is regained. Some special agent must be brought into play. The change is comparable with that produced by ultra violet light in ergotsterol, physiologically a neutral substance; this is converted into calciferol, a bone growth inducing agent of extraordinary potency. At least, the clue thus given should be followed and search made in irradiated cancerous material. The isolation of an antidote to the disease would indeed be a service—pending the far higher discovery of the cause of the disease and the prospect of preventing it. The making of new hydrocarbons which will induce cancerous growths is a poor game to play—in no sense cancer research; to engage in it is to waste time and money and raise false hope. In fact, such work is a confession of impotence, of inability to develop any real attack upon the position. We have to do as the Italians are doing—send cavalry up into the mountains and dash our cars across torrents where the bridges are down. So long as inquiry is directed merely by medical advisers no progress will be made. Medicine, after all, is but a higher branch of applied chemistry. The chemist, therefore, must assert himself and take the place he alone can take in leading the hunt—of course, he must be a physiologist too. Peoples living under healthy natural conditions, naturally fed, we know, are not subject to the disease. Acting upon this clue, we may *Cherchez la femme* straightaway.

Safety of Canned Foods

THE death of three London women from botulism as the result of eating potted nut meat brawn calls attention to a danger the odds against which, according to the coroner who conducted the inquest on the victims, may be in the nature of millions to one. The fact remains, however, that it is a danger that does exist in the most highly efficient food preserving process, and it is satisfactory to note that the closing of the inquest does not mark the end of the investigations to find out where the infection actually came from, and

that those investigations will not be limited to vegetarian products. We have it on the authority of Mr. W. B. Adams, deputy director of the Bristol University Fruit and Vegetable Preservation Research Station, that all the vegetable canners in this country are using an absolutely safe process and that the industry is turning out something like 200,000,000 cans per annum. No branch of chemical science has been more thoroughly investigated in recent years than that concerned with the purity of canned foods, and we are convinced that not even the death of three persons in one area, deplorable though they are, will shake the public faith in the safety of consuming such foodstuffs.

California was probably the pioneer of food canning, and one of the witnesses at the inquest last week is reported to have said that the knowledge gained there was only filtering through to this country gradually. We do not believe that the British canner is in any way behind the American in his appreciation of the vital importance of purity or in his application of scientific methods, and we have no doubt that any new knowledge that arises out of the present investigations will be eagerly adopted throughout the industry. The fact that nut meat brawn of the same kind as that concerned has been made for 29 years and no previous case of botulism has been traced in connection with it is reassuring.

Chemistry as an Agent of Peace

THE international troubles that loom so large on the horizon have involved much discussion of "sanctions," and of the wisdom or possibility of their application. It is a curious commentary upon history that the nations that are the prime cause of uneasiness to their fellows are in every instance those that are governed by a Dictator, or in which a dictatorship has been established since the war. We seem to have progressed very little from the Middle Ages when the personal desire for aggrandisement of a powerful ruler was a prime cause of war. It is quite easy for anyone possessing supreme power to persuade the people dominated by him that their desires and interests are parallel with his ambitions. The methods of a dictator wishing to emulate Napoleon and those of Hollywood wishing to sell a film are, thanks to modern publicity methods, surprisingly similar. Chemistry is the handmaiden of war, and the cataclysm of 1914 taught us that no nation can afford to neglect the chemical industry in the interests of its own safety. Can chemistry be made the handmaiden of peace by providing the means whereby war shall be made impossible?

The hope so frequently expressed that the very frightfulness of chemical warfare would lead all nations to abandon war is vain because it neglects certain human factors. One is that the people who initiate wars are not the people who do the fighting. Another is that the human mechanism is remarkably adaptable, so that conditions which to one generation seem too awful to be endured become the commonplace of the next generation; who, for example, that can remember the peace and safety of our roads 40 years ago, could contemplate the dangers and turmoil to-day, which must seem to a Rip Van Winkle akin to walking along a railway line along which the express trains of 1935 were continuously thundering. To every action there is a corresponding reaction; for every acid there is an alkali, for every poison an antidote. To endeavour to make warfare too frightful for an aggressor only excites chemistry to provide either a means of alleviating the frightfulness, or of making a yet more frightful response. Along that way there lies no hope that chemistry may prevent war.

Supplies of Minerals

QUITE recently, Sir Thomas Holland has written a book entitled "The Mineral Sanction as an Aid to International Security," in which he elaborates the thesis propounded in his Trueman Wood lecture at the Royal Society of Arts meeting in 1930, which is briefly that "sanctions" should be applied by withholding supplies of minerals from belligerent countries. There are many minerals that the chemist needs in order to prepare from them the metals that are so necessary in peace and so essential in time of war. The British Empire and the United States combined control some three-quarters of the metals and minerals that are necessary for carrying on a war. If these supplies could be stopped, the war must cease. The plan seems amazingly simple, but, like most simple plans, has its difficulties. One of these is that, as is now evident, the United States may refuse to take any part in the application of sanctions on the ground that sanctions applied to a headstrong nation with a resolute leader determined to gain his way are almost certain to become a *casus belli*. A nation that applies sanctions must be prepared to go to war in support of them and the danger of spreading the conflagration is great indeed unless the sanctions are completely effective. There is another defect in the scheme which is that a nation which premeditates war—and it is just those nations that sanctions are designed to curb—would lay in a plentiful supply of raw materials and metals before declaring its intention. How did Germany manage to hold out so long when *all* supplies were cut off? The application of a minerals sanction does not seem to be the solution to the difficulty of curbing the ambitious; we doubt, frankly, whether there is any one way of doing so, and though chemistry will certainly provide assistance in that direction it can be little more than a contributory factor to maintaining the peace of the world.

Cost of the Beet Sugar Subsidy

INTERESTING details of the Government's proposals for the continuance of the subsidy to the beet sugar industry, to which reference was made in these columns last month, are contained in a White Paper just issued. This discloses that, providing there is no change in the standard conditions throughout the transitional period, the maximum amount of subsidy payable on the 1936 crop will be £2,940,000. This compares with £4,450,000 for 1934 and £3,640,000 for 1935. The value of the duty preference is estimated at £2,900,000 in 1935 and also in 1936. The amount of duty paid or estimated to be payable to the revenue is: 1934, £2,500,000; 1935, £2,300,000; 1936, £2,300,000. The possibility of a licensing system for the production of refined sugar is suggested. The Government, it is stated, does not desire to impose such a system on an unwilling industry, nor would it do so unless consumers' interests could be properly protected. It considers, however, that it would be expedient to provide for the possibility of a licensing system. Accordingly, it proposes to seek power to introduce such a system, subject to the specific approval of Parliament, if the Sugar Commission recommends it.

Industrial Chemistry in Canada

By Dr. G. S. Whitby,

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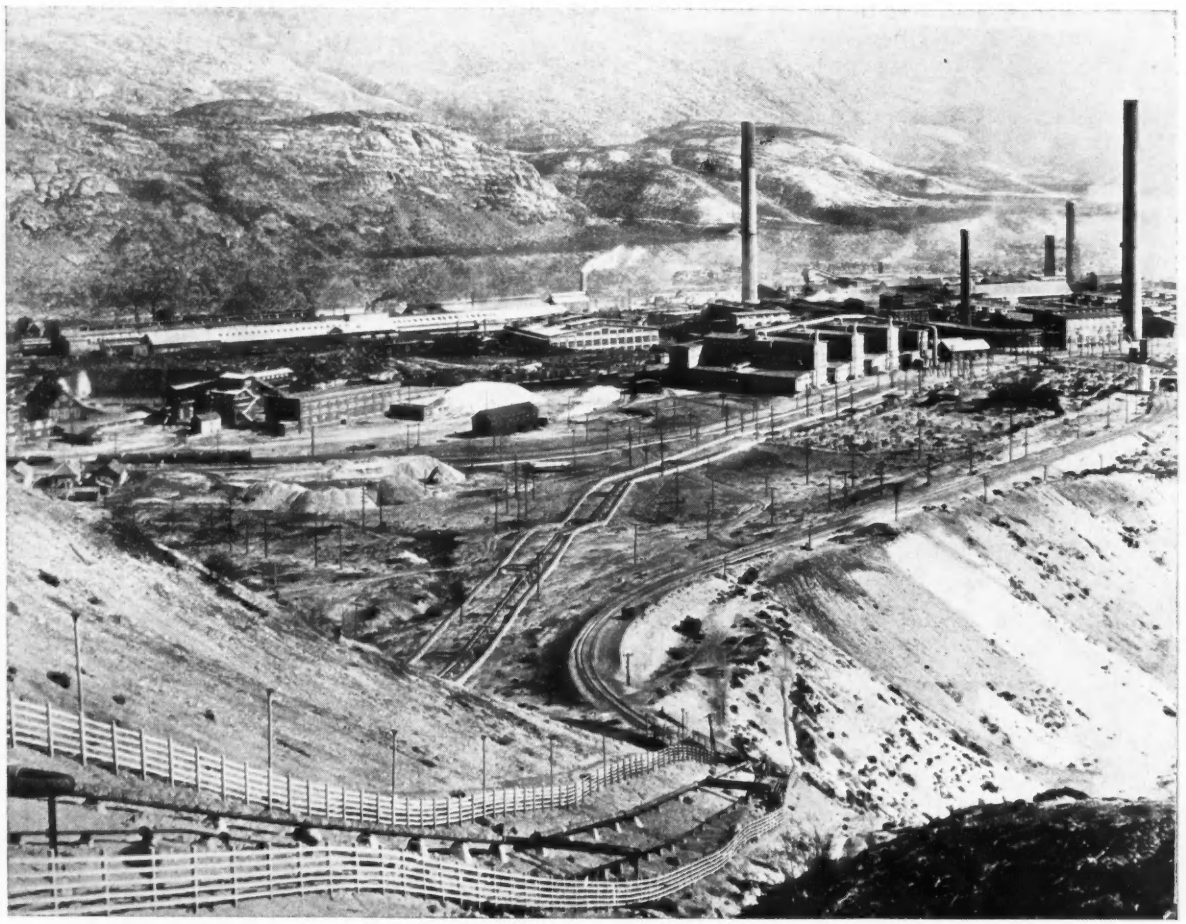
IN reviewing some of the outstanding technological advances which industry has made in Canada during the last decade, it is not inappropriate to start with that branch of chemical industry which is concerned with the production and refining of metals.

In 1926 the fine plant at Arvida (Quebec) started to produce aluminium, making use of a large amount of electricity produced from the rushing waters of the Saguenay River. Exports of aluminium from Canada rose from 11,327 tons in 1924 to a peak of 36,485 tons in 1929. In 1927 a plant was installed at Arvida for refining the aluminium ore, bauxite, by a novel electric furnace process which eliminates the iron as merchantable ferrosilicon. As a result, from 1928 onward bauxite ore, from British Guiana, has been the raw material of aluminium manufacture in Canada, in place of refined alumina formerly used. In 1928 cadmium was produced for the first time in Canada; in 1930, bismuth; in 1931, selenium, and in 1933 radium and uranium compounds. Canada is potentially a large producer of selenium, a by-product of copper refining. The known uses of selenium are limited, however, and if a large increase in production is not to break the price, research on new uses for the element is much to be desired.

An important advance based on research carried out in Canada was signalised by the construction at Trail in 1930 of a plant, with a daily capacity of 100 tons, for recovering zinc by fuming from slag piles. A marked change has come over copper production in Canada. Largely owing to the imposition of a 4 cents duty on blister copper by the United States, the refining of copper in Canada has undergone a great development. In 1924 only 1,768 tons of refined copper was produced in Canada; by 1931 the amount had risen to 92,183 tons. The total production of copper rose from 52,228 tons in 1924 to 151,739 tons in 1930 and a still higher figure in 1934. Canadian production of refined lead rose from 65,235 tons in 1924 to 152,225 tons in 1930 and still more in 1934. A significant advance in gold recovery is the recent application to gold ores of the flotation method of concentration prior to dissolving the gold out by cyanide solution. The Gold Medal of the Canadian Institute of Mining and Metallurgy was awarded to R. J. Denny in 1932 for this advance.

The production of stainless steels at Shawinigan Falls is another recent development of note. Mention should also be made of the fact that a much wider range of alloys of the ferro-silicon type, products of the electric furnace used by the steel industry, is now being made in Canada than was the case in 1924.

The development of better refractories, capable of withstanding higher temperatures and having greater resistance to

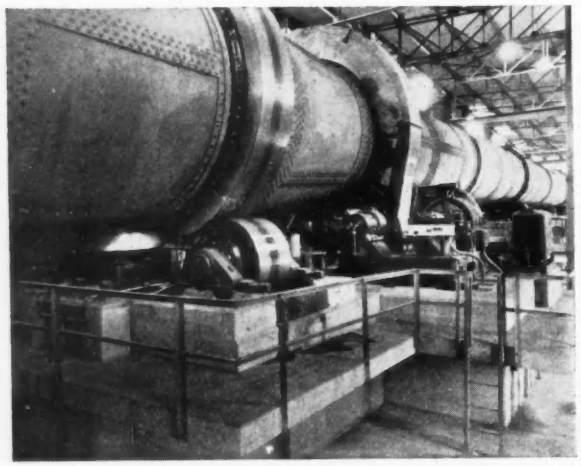


General view of Smelter at Trail, B.C., showing the sulphuric acid plants. The capacity of the three units is 375 tons of 98 per cent. acid per day. In the foreground is seen the pipe which conveys the acid to the chemical and fertiliser plants on Warfield flat, 400 ft. above the smelter. The U-bends in the pipe serve to take up the expansion and contraction due to temperature changes.

attack by the furnace contents, has necessarily been a condition of metallurgical progress. The fact is therefore deserving of note that during the last decade there has been a notable advance in the production of basic refractories in Canada from the magnesium rock of Quebec. A considerable tonnage of refractory material was produced from this rock during the war, but when the pure, Austrian magnesite again became available, the business dwindled away. Thanks, however, to intensive research carried out by the National Research Council in co-operation with Canadian Refractories, Ltd., the industry has been re-established; the technical difficulties presented by the Quebec rock have been overcome, and there has been developed a product which has such advantages over the Austrian product for lining open-hearth steel furnaces that it is actually receiving a premium over the latter in the export market.

While those branches of chemical industry which deal with organic substances have in general been subject to rapid change, owing to the frequency with which new and improved products have been developed, the inorganic chemical industry—the so-called "heavy" chemical industry, which embraces what may be called the staples of chemical manufacture, such as inorganic acids, alkalies and salts—has been relatively stable. Yet even here there have been very notable developments during the last decade.

In 1931 plants were put into operation by the Consolidated



The largest cement kiln in the world. The 414ft. kiln of the Canadian Cement Co.

Mining and Smelting Co., at Trail (B.C.), and Canadian Industries, Ltd., at Sandwich (Ontario), for making synthetic ammonia—snatching inert nitrogen from the very air and turning it into a chemical compound, used at Trail for the manufacture of nitrogenous fertilisers and in the case of Sandwich for the production of nitric acid employed in the manufacture of explosives. In the process used, which was originally developed in Germany, there is employed a technique, *viz.*, the application of very high pressures to bring about chemical reaction between gases, which is becoming increasingly important in industrial chemistry. Ammonium phosphate, a highly concentrated fertiliser containing both nitrogen and phosphorus, is also now being made at Trail, while triple superphosphate fertiliser is being made there and at Beloeil (Quebec). The effect of these developments is reflected in the production of fertilisers in Canada from $2,504,573 in 1930 to $4,231,598 in 1933.

The utilisation of the deposits of sodium sulphate occurring in dried-up lakes in Saskatchewan has been undertaken seriously in recent years. The removal of the 62 per cent. of water present in the crystals presented peculiar technical difficulties, which have, however, been overcome; and the dry salt, known as salt cake (because it was originally secured as a residue when common salt was treated with sulphuric acid in order to produce hydrochloric acid) is in part being shipped to the Sudbury district, where, by treatment with sulphuric acid, it is converted into sodium bisulphate, known as nitre cake (because it was originally secured as a residue when Chile nitre was treated with sulphuric acid in order to produce nitric acid) for use in the production of nickel from its ore. Another part of the salt cake is being used in glass manufacture. The effect of this new development, based on the utilisation of domestic resources, is clearly seen in the fact that the production of salt cake in Canada has risen from 1,033 tons in 1924 to 66,900 tons (estimated), valued at $519,000, in 1934; and that imports of salt cake have dropped from a maximum of 42,333 tons ($686,458) in 1927 to 2,595 tons ($34,371) in 1933, while imports of nitre cake have dropped from a maximum of 80,872 tons ($1,081,984) in 1929 to 574 tons ($15,989) in 1933.

Sulphuric Acid Production

Sulphuric acid is so widely and extensively used in modern industry that it has been said with some justification that the per capita production of the material in any country is an index of industrial development there. The most interesting advance in Canada in regard to this staple commodity is that, whereas formerly the raw material used was exclusively either pyrite or imported sulphur, in 1925 a plant was put into operation at Coniston, near Sudbury, in which waste smelter stack gas, containing sulphur dioxide, is used as the raw material for sulphuric acid manufacture. This was followed more recently by a large plant at Trail also using smelter gas. Another development of note concerning mineral acids is the production in 1925 for the first time in Canada, at Sandwich, of hydrochloric (muriatic) acid, not as formerly from common salt by treatment with sulphuric acid, but from the hydrogen and chlorine gas derived from cells in which brine is subjected to electrolysis for the primary purpose of producing caustic soda.

Very recent developments are the production of calcium cloride by the Brunner, Mond Co., at Amherstburg (Ontario), a material imported in recent years, chiefly for laying dust on roads, to the extent of about $500,000 a year; and the erection at Cornwall (Ontario), by Canadian Industries, Ltd., of a new plant for the production of chlorine—so important as a bleaching agent in the pulp and paper industry—and caustic soda by the eletcrolysis of brine. The manufacture, at Hamilton, by the last-mentioned firm of liquid sulphur dioxide, used as a refrigerant and in water treatment, is another forward step of the last year or two. The design of the plant was based on experimentation carried out in Canada.

Other products newly made in Canada for the first time are sodium chlorate, of growing importance as a weed killer, tri-sodium phosphate, an alkali used in many cleaning preparations, and calcium acid phosphate, used in baking powders. The manufacture of these has lately been undertaken by the Electric Reduction Co., at Buckingham (Quebec).

Progress Based on Canadian Research

It is particularly gratifying to record the developments for which Shawinigan Chemicals, Ltd., at Shawinigan Falls (Quebec), have been reponsible during the last decade, because they are based on research carried out in Canada, and not, as in a good many other cases, on imported research results. Using hydro-electric energy for the production of calcium carbide, which serves as a starting-out point, the company, thanks to its admirable research laboratory, has developed the manufacture of a range of synthetic organic chemical products, the latest of which is a remarkable series of synthetic resins, the vinyl acetate resins, which are exciting much interest both in Canada and outside and seem to have a wide field of usefulness. Thanks to persistent research directed toward process improvement, the company occupies a strong position in regard to the manufacture of synthetic acetic acid.

Another interesting advance initiated by research carried out in Canada concerns oil refining. This is the use of phenol (carbolic acid) as a refining agent in the production of lubricating oils. The process was developed in the laboratories of the Imperial Oil Co., at Sarnia (Ontario), and has, it is understood, lately been put into operation by refineries in other parts of the world.

The tremendous recent growth in the use and hence the manufacture of cellophane must have forced itself on the attention of everybody. In the United States factories producing this new material, ran night and day throughout the depth of the depression. A plant for the manufacture of cellophane in Canada, at Shawinigan Falls (Quebec), started operations last year.

The world production of rayon grew from 64,500 metric

tons in 1924 to 284,000 tons in 1933. Rayon was first produced in Canada at Cornwall (Ontario), in 1925, the viscose process being used. In 1927 a plant for the production of acetate rayon was established at Drummondville, Quebec. The volume of production of rayon in Canada has steadily grown, and in 1933 was about 3,500 metric tons. It is gratifying to note that the acetic acid used for acetate rayon manufacture in Canada is made at Shawinigan Falls, and that the production in Canada of the sulphur dichloride employed was undertaken a year or two ago by Canadian Industries, Ltd.

Canada continues to be the chief producer of the special grade of wood pulp used in the manufacture by viscose rayon and cellophane. By dint of continuous research carried out here, there has been established and maintained a reputation for uniform quality which has made Canadian pulp for rayon in demand the world over. In view of competition from Finland and other countries, and possibly from pulp prepared from pine in the southern states, it is imperative that research shall be continued, directed to effecting still further improvement and to developing, as it seems possible to do, grades of wood pulp capable of replacing cotton linters for the manufacture of acetate rayon, celluloid, etc.

The pure grade of carbolic acid, phenol, used for the manufacture of bakelite has been made by the Dominion Tar and Chemical Co. since 1930. The manufacture of the newer type of detonating materials for blasting caps, to replace the older fulminating mercury type, has been undertaken by Canadian Industries, Ltd. Other instances of new Canadian lines of manufacture in the chemical field are—the manufacture of "dry ice" (solid carbon dioxide); the production of certain grades of dextrin; the manufacture of safety glass, not of the usual sandwich type, but of the new, toughened, flexible type; the manufacture of a wider range of pharmaceuticals, including compounds of iodine, bismuth and potassium. The production of zinc white has been started, although the major supplies of this pigment are still imported, and other important pigments are also imported (lithopone, used in paints and rubber, was imported to the value of $852,079 in 1929).

No industry is proof against the possibility of finding the ground cut from under its feet by technological developments elsewhere; it can, however, minimise the risk of such possibility by steadily maintaining research directed to improving its processes and products and to securing maximum values from its material. It is not necessary to seek far for an instance from Canadian chemical industry of the impact of research developments elsewhere on the prosperity of an apparently well-established industry. Such an instance is the hardwood distillation industry, an industry in regard to which Canada, on account of the availability of hardwood, is favourably situated. The value of the products of this industry fell from a peak of $7,654,202 in 1918 and a post-war maximum of $4,982,283 in 1920 to $2,036,569 in 1933. The main products of the industry are acetate of lime (used for the manufacture of acetic acid), wood alcohol (used for denaturing alcohol and for the production of formaldehyde, a material employed in the manufacture of bakelite and as a disinfectant), acetone (a varnish solvent) and charcoal. All these products, except the last, are now made by new, competitive synthetic processes, and, but for the assistance which the tariff on wood alcohol has afforded, the hardwood distillation industry in Canada would probably have declined to a greater extent than has been the case.

Chemical Imports in India in 1934-35

Increased Activity in Textile Industry

IMPORTS of heavy chemicals into India during the fiscal year ended March 31 showed continued expansion, and increased activity in the textile industry was reflected in the imports of such commodities as bleaching powder, which rose by nearly 27 per cent. over the previous year. According to a survey of the import trade of India prepared by the senior British Trade Commissioner in India and published by the Department of Overseas Trade, the total imports of heavy chemicals during the year under review advanced from £2,025,000 to £2,190,000, and the increase was fairly well distributed over the separate categories dealt with in the report. Increases were recorded in the following items: Acids, total imports £75,750 (against £59,250 in the previous year); bleaching powder £84,750 (£66,750); carbide of calcium £50,250 (£48,000); glycerine £29,250 (£28,500); sodium carbonate £507,000 (£479,250); sodium cyanide £21,750 (£20,250); caustic soda £315,000 (£267,000); sodium silicate £21,000 (£18,000). The following items showed decreases: Copper sulphate £24,000 (against £27,000); disinfectants £48,000 (£51,750); potassium chlorate £58,500 (£76,500); sodium bicarbonate £57,000 (£62,250); sulphur (brimstone) £129,000 (£155,250).

There is a substantial market in India for all sorts of heavy chemicals. More than 50 per cent. of the market is supplied from the United Kingdom, followed by Germany with slightly over 12 per cent., Japan with slightly more than 8 per cent., the United States and Italy with almost 6 per cent. each. Within the last fiscal year United Kingdom manufacturers and exporters to some extent recovered their share of the trade as compared with the previous year, chiefly in sodium compounds, particularly caustic soda and sodium carbonate, and principally at the expense of Japan. Japan's share of the trade is in large measure due to supplies of caustic soda, sodium bicarbonate and potassium compounds.

There was a satisfactory advance in trade in dyes obtained from coal tar from £1,582,500 to £2,055,000. No details are available in the published returns as to the countries of origin, but the following statement gives a comparison of the arrivals under the separate categories: *Alizarine*—Moist: Not exceeding 16 per cent. £17,250 (against £15,750); over 16 per cent. but not exceeding 20 per cent. £115,500 (£101,250); exceeding 20 per cent. £45,000 (£32,250); *Congo red* £109,500 (£55,500); *Coupling dyes of the naphthol group*—Naphthols, rapid fast colours (rapid salts) and bases £279,000 (£220,500); other salts £960,000 (£65,250); *Vat dyes*—Indigo £132,750 (£121,500); Other sorts—paste £60,000 (£34,500); powder £478,500 (£348,750); *Sulphur black* £72,000 (£98,250); *Metanil yellow* (£45,000 (£30,000).

There was a slight fall in the total value of drugs and medicines, from £1,447,500 to £1,440,000. No details are available as to the countries of origin, but the comparative trade in the two years in question in the particular items included under the general heading are given as follows: Camphor £162,000 (against £173,250); proprietary and patent medicines £292,000 (£232,500); quinine salts £194,250 (£237,750); saccharin £18,000 (£18,000).

There was a small increase in the total value of paints and colours, although as a result of slightly higher prices, the quantity imported showed a slight reduction. The total imports in 1933-34 were 369,815 cwt. (£527,250) and in the current year 355,603 cwt. (£555,000). Of this trade, much the greater share fell to the United Kingdom. The imports from that country rose from 179,387 cwt. (£351,000) to 186,341 cwt. (£365,250). The nearest competitor was Japan, the imports from which country rose from 46,576 cwt. (£47,250) to 53,977 cwt. (£60,750). The imports from Germany fell considerably in quantity from 49,450 cwt. to 31,287 cwt., although, as a result of better prices, the value receded only slightly from £56,250 to £54,750. The imports from the U.S.A. fell in quantity from 5,821 cwt. to 5,367 cwt., but registered a slight increase in value from £17,250 to £18,750.

There was a fall of more than 30 per cent. in the quantity of the imports of soap, although, as a result of better prices, the fall in value was somewhat less. The total arrivals fell from 303,413 cwt. (£588,000) to 206,807 cwt. (£474,000). The United Kingdom secured the great bulk of this trade, the imports from that country being 174,635 cwt. (£398,250) as compared with 234,210 cwt. (£477,000) in the previous year. The imports of soap were classified as follows: Household and laundry soap 157,246 cwt. (£227,250); toilet soap 44,628 cwt. (£235,500); other sorts 4,933 cwt. (£10,500); total 206,807 cwt. (£473,250).

The Physical Properties of Lac

A Survey of Available Data

THE London Shellac Research Bureau, which is controlled by the Indian Lac Cess Committee, has just ussued a paper by Dr. Lal C. Verman, M.Sc., F.Inst.P., A.I.R.E., on the mechanical properties of lac. Being a natural product and not a simple chemical entity, the chemical examination of lac in the ordinary analytical sense of the term can do little more than serve to identify it, and to indicate the absence or presence and possibly the extent of adulteration or deterioration, says Dr. Verman. To some degree the results of chemical examination can be related to the usefulness, quality of service and the performance value of the material, but only by the appraisement of the physical properties can the true value of the material be fixed. Unfortunately the physical qualities cannot always and easily be expressed in terms of measurable quantities, at least not in a form suitable for incorporation in specification details.

Determination of Specific Gravity

In the case of lac, the determination of specific gravity, by the usual method of weighing first in air and then in water, is open to criticism, for lac has a tendency to swell in water. Other liquids can be substituted for water, but even then there may be a danger of some small amount being taken into solution unless the immersion is very rapid. It is not surprising, therefore, to find that the results reported by the earlier workers are erratic.

Olsen in 1932 made measurements in kerosine by pyknometer method as specified by the A.S.T.M. 1927, for pigments, with the following average results for moisture-free samples of lac at 15.5° C/15.5° C.: Pure orange T.N. 1.207, bleached dry 1.196, bleached dry refined 1.217, shellac wax 1.028 (using 95 per cent. alcohol instead of kerosine).

In these experiments the variation between the average and the individual determinations were of the order of 1 per cent. The importance of using moisture-free shellac for these determinations cannot be too much emphasised. It is therefore shown that lac in general has a greater specific gravity than most natural resins which range from 1.05 to 1.095, but less than a good many synthetic resins which range from 1.10 to 1.71.

It was suggested by Oberdoerfer that the divergence between the specific gravities of lac (about 1.20) and rosin (about 1.07) may be usefully employed as a means of detecting adulteration of lac by rosin. This method may give a rough approximation of the composition of a mixture, but cannot be considered as reliable owing to the inherent variation always expected between different samples of a natural product and to which the values for specific gravity are no exception. Aldis has suggested that acidified water may prove a suitable medium, as water containing traces of hydrochloric acid does not affect shellac flakes even after six months' immersion at ordinary temperature.

Abrasion Resistance

The hardness and abrasion resistance of lac is an important property, and one in which lac ranks high in comparison with any other resinous material, especially when applied to surfaces without the use of solvents. Examples of such use are the production of turned lacquer goods as made in India, and the melting of powdered lac on the surfaces following the procedure adopted in the manufacture of playing cards and laminated products. Unfortunately there are no published records of the results of measurements on the hardness of raw lac or shellac applied to surfaces after the manner mentioned above. Although lac is unique in this matter, it is surprising that no effort seems to have been made to evaluate this very useful property.

The hardness of lac mouldings is, no doubt, controlled by the precuring treatment applied, if any, to the moulding composition, the moulding conditions (time, temperature and pressure) employed and the extent of stoving treatment given subsequently to the moulded articles. Much more important, however, is the nature and amount of the "filler" material used; hence, for example, the use of carbon black and slate powder in the production of the "biscuit" from which gramophone records are pressed. When lac films are applied by the use of solvents they are usually considerably softer than straight lac products; this relative softness is due partially to the retention of a certain amount of solvent and partially to the use of plasticisers.

Considerable experimental work has been carried out on the examination of lac films chiefly by the scratch method and the abrasion resistance. A needle point or a small spherical ball point is loaded down by gradually increasing weights and the film panel to be tested pulled under the point, until a load is found which just scratches the film. The Air Ministry's specification apparatus, in which a 1mm. diameter steel ball is used, has been adopted. Dispositions are made so that when the film is scratched right through its thickness, that is when the ball makes contact with the metal panel, an electrical circuit is completed which can be used to light a lamp. When panels of insulating material such as glass are used the scratches can be observed under the microscope and the minimum scratching load determined. It is obviously most important in these tests that the film thickness should be uniform.

Relative Hardness of Films

The relative hardness of films is also identified with the abrasion resistance (to the action of sand). The apparatus used to determine abrasion resistance consists of an air-sand blast operating at a constant air pressure of 10 lb. per sq. in., the panel carrying the film under test being held at an angle of 45° to the direction of the blast. The amount of sand necessary to wear off the film is taken as a measure of the abrasive resistance.

Besides possessing to an extraordinary degree the quality of strong adhesion to almost all types of solids such as metals, glass, mica, glazed porcelain, paper, fabrics, wood, etc., lac possesses the property of not being sticky. This combination of properties is responsible for much of the modern industrial use of lac just as it was chiefly responsible for the development of the native industries in lac working such as the manufacture of turned ware, etc. Lac films produced from varnish can be "flatted" by sandpaper without sticking in spite of some degree of softening due to the heat developed by friction during working. The properties of lac as an adhesive have been quantatively and extensively studied in pure form and as part of various compostitions and cements by McBain, Hopkins and Lee. Their work is of particular importance since it affords a direct comparison between lac and lac products and other synthetic and natural adhesive materials and compositions, such as, for example, phenol-formaldehyde resins, cellulose derivatives, silicates, glue, gelatin, etc. Whilst having regard to the difficulty of directly comparing the performance value of such diverse materials, one inevitably comes to the conclusion that lac and adhesive compositions based on lac far excel any other adhesive investigated.

Mechanical Strength

In order to compare the relative merits of resins for moulding purposes it is important to know something about their mechancal strength although the strength of the final moulding depends only in part on the strength of the resin. Other factors such as adhesion of resin to the filler, the type and amount of filler and its own mechanical properties contribute considerably to the final strength of the moulding.

The tensile strength of shellac decreases slowly with rising temperature, but it is always considerably greater than that of colophony, which shows a sharp maximum at about 32° C. Mixtures of shellac and colophony seem in general to be more or less intermediate, *i.e.*, weaker than shellac, but stronger than colophony but not strictly proportionate.

Measurements of the velocity of sound in lac can be used to deduce the modulus of elasticity, a matter of paramount practical importance in comparing various types of plastic materials. Direct measurement of the property cannot easily be carried out on plastic materials owing to plastic flow, which is a function of time. By using sound waves as the means of imposing a strain on the plastic solid, its elastic reaction can be determined instantaneously and all questions of plastic flow are eliminated. This is a very useful con-

ception which may be more widely applied to the examination of plastic products than is the case to-day. It is also suggested that if, in addition, the sound absorption of a plastic material were known at varying intensities and frequencies it should be theoretically possible to compute the plastic constants of the material as well as the elastic constants. There is no theoretical analysis which specifically deals with this relationship between plastic properties of a material and its sound absorption, but it appears reasonable that such a correlation could be worked out, provided the theory of plastic behaviour of materials was sufficiently well established.

It may be thought that exact knowledge relating to plastic materials is at present so limited that theoretical developments of the kind indicated would be premature unlesss a systematic programme of experimental work were carried out simultaneously. Nevertheless, it is clear that there is great scope for investigation work in this region, work which would be of great value to the plastics industry in all divisions.

Factory Developments in 1934

Statistics from the Board of Trade Industrial Survey

THE extent to which industrial development in the form of new factories and factory extensions took place in Great Britain during 1934 is indicated in a report on the "Survey of Industrial Development for 1934" just issued by the Board of Trade. The report, which is based on reports received from factory inspectors and information collected by the Ministry of Labour through its local officers, shows the areas in which development took place, the nature of the trades contributing to such development and comparable particulars of factories closed during the year. Establishments such as laundries and dry-cleaning works not engaged in manufacture or in the processing of new goods are not included.

The survey discloses that 478 new factories employing some 37,200 people were established in 1934, that there were 144 factory extensions and that 515 factories were closed. Of the new factories, 209 were in Greater London (employing 15,750 hands) and in that area there were 38 factory extensions, and 162 factories were closed. In North-West England the number of factories closed was nearly twice that of the number of new factories opened, namely, 156 closed against 82 new factories opened.

New Undertakings in Greater London

The majority of the new undertakings employ between 25 and 100 workers and the average over the whole field is 78. Ninety-six of the new factories employ over 100 people. Seventy-eight of the new factores represent transfers from other areas and this fact has been shown in the survey where it has emerged. Transfers of factories within the same area have, as a general rule, been ignored, as amounting to no more than a local change of address. The large proportion of transferred factories in greater London (59 out of 78) may be due partly to the fact that the areas into which the Greater London region has been divided for the purpose of the survev are smaller than the areas in the other regions. Since transfers inside the areas have been ignored, the effect of the division into larger areas in the regions other than London has been to make the number of transfers appear less in those regions. Of the 59 cases reported for the London region no less than 49 were transfers from other areas within that region; this is a similar position to that observed in respect of 1933, when 50 out of 59 were cases of transfer within the London region. Only 19 of the transfers were inter-regional, of which 10 were to Greater London, 4 to S. and S.W. England, 3 to the Eastern counties and 2 to the N.E. coast area. Of the 17 factories thus transferred to regions in the southern part of England, only 4 came from the north, viz., 3 from the North-West region and 1 from Scotland, and all four were established in Greater London. This is the only evidence that has been forthcoming of "the drift of industry to the south" in the sense that new factories in the south are the results of transfer from the north, and confirms the impression conveyed by the similar results obtained in connection with the 1933 survey, in which year, on balance, 3 factories only were transferred from the three northern regions to the south.

An attempt was made to obtain information as to the motives which influence industrialists in the choice of sites for their factories. This information was obtained verbally and is in many respects vague and incomplete, as there was little opportunity for the careful and exhaustive questions necessary to secure reliable statistics. In view of the interest shown in the movement of industries and of the inadequate information available generally on the subject, the survey includes a classification of the reports obtained in 299 cases. This classification is given as follows:

Accessibility of raw materials	33
Proximity to markets	27
Suitability of labour	18
Cheap land, low rent or low rates	17
Proximity to other factories in the same industry	33
Convenience of premises	163
Proximity to employer's residence	4
Transfer as part of process of rationalisation	4
Total	299

Of the 478 new factories established last year, 71 are branch factories; for 1933, the corresponding figures were 69 out of a total of 467. Thus in each year, about 15 per cent. of the openings represented new branches of existing concerns. The distribution of these new branches by industrial groups is as follows, the figures for 1933 being given in brackets:—

Non-metalliferous mining products	1	(1)
Bricks, pottery, glass, etc.	3	(7)
Chemicals	3	(2)
Iron and steel (primary and secondary)	2	(7)
Engineering	12	(5)
Vehicles	4	(1)
Non-ferrous metals	1	(—)
Textiles	15	(5)
Leather	1	(4)
Clothing	9	(16)
Food, drink and tobacco	4	(9)
Timber	6	(6)
Paper, printing and stationery	3	(5)
Miscellaneous	7	(1)
Total	71	(69)

Connections with Export Trade

Information has been obtained which shows that 105 of the factories established in 1934 have connections with the export trade. Classified by trade groups the distribution is as follows:—

Textiles	28
Clothing	19
Engineering	16
Paper, printing, etc.	7
Chemicals	6
Iron and steel	5
All other	24
Total	105

Five of the six chemical factories included in this classification are in Greater London.

The number of factories established by, or with the assistance of foreign concerns included in the total of 478 is 34, the corresponding figures for 1933 being 467 and 37 respectively. Ths nationalities of the foreign concerns involved are:—German 9; American (U.S.A.), Belgian, Italian, and Austrian, each 3, Swiss and Canadian, each 2; and Russian, Polish, Hungarian, Dutch, French, Czechoslovak and Swedish, each 1; while in two cases the nationality of the foreign concern is stated to be dual—*viz.*, U.S.A. and German, and French and German. Four of these factories are engaged in chemical manufacture. In view of the difficulty in many

cases of separating the employment originally provided by a factory from the additional employment provided by an extension to that factory, it is not possible to give exact figures of the employment provided by extensions, but it is probable that the employment provided by these extensions exceeds 8,000. Employment figures for factories closed which are comparable with the employment figures of the new factories are not available.

A general trade classification of the new factories is set out in the following statement:

	New factories.	Factory extensions.	Factories closed.
Non-metalliferous mining products	10	5	7
Bricks, pottery, glass, etc. ...	27	12	8
Chemicals	18	1	21
Iron and steel, primary and secondary processes	22	10	25
Engineering	40	21	48
Vehicles	13	8	10
Non-ferrous metals	12	1	9
Textiles	60	25	153
Leather	11	1	10
Clothing	122	24	109
Food, drink and tobacco	24	14	21
Timber	55	9	47
Paper, printing and stationery ...	30	5	24
Miscellaneous	34	8	23
Totals	478	144	515

Of the 10 new factories in the non-metalliferous mining and quarrying products group of industries, 4 are engaged in the distillation of coal by-products and the production of coke or patent fuel. Five of the 10 new factories are in Greater London, the remainder being widely scattered over the country. Of the 27 new brick, pottery and glass factories, 24 are engaged in the manufacture of bricks and tiles; of these 9 are in the Nottingham, Derby and Potteries area. There are also 11 factory extensions in this line of business. The other three new factories are engaged in the glass trade. The principal industries included in the miscellaneous group are:

	Factories opened.	Factories extended.	Factories closed.
Rubber goods	7	1	5
Musical instruments	1	—	4
Buttons, fancy goods, etc. ...	17	2	3
Scientific instruments	4	3	4
Toys, sports goods, etc.	2	1	3
Miscellaneous	3	1	4
Totals	34	8	23

Of the new factories included under buttons, etc., 12 are engaged in working up synthetic resins. The "miscellaneous" group covers such trades as linoleum and oilcloth, ship-breaking, shop fitting and building. Of the 18 new factories recorded for the chemical group of trades, 14 are in Greater London, and this number includes 6 establishments engaged in the manufacture of soap, perfumery and other toilet preparations. Mention may also be made of the oil refinery at Ellesmere Port. The 21 chemical factories closed last year included 15 from which the work was transferred to other establishments; in 9 cases the transfer was to a new factory set up in another area.

Of the 12 new factories in the non-ferrous metals group, 3 are engaged in polishing and plating, 2 in the brass trade and 1 each in the production of aluminium foil, copper and zinc sheets, lead, magnesium, zinc, and jewellery and clocks and watches. Six of these establishments are in the Birmingham district. Of the 9 factories closed, 3 were in the jewellery trade and 2 each in electro plate and brass trades; 4 of the factories were in the Birmingham district.

Of the 7 new silk and artificial silk factories, 6 are engaged in the artificial silk trade, as are also 2 of the extensions; no factories engaged in this industry closed. Three of the 11 closures of textile finishing factories were attributed to rationalisation.

The Sir John Cass Technical Institute

Lectures During the Coming Season

THE Sir John Cass Technical Institute is playing its part quietly and efficiently in giving students a thorough training in chemistry and metallurgy. The chemistry departments comprise six laboratories, balance rooms, preparation rooms, lecture rooms, and special laboratories for the courses of instruction in bio-chemistry and in petroleum technology. The laboratories are well fitted for all stages of experimental work in inorganic, physical, organic and applied chemistry. The courses of lectures and laboratory work are arranged to meet the requirements of those engaged in chemical industries, or in trades associated with chemical products. Each course extends over the full session, unless otherwise stated, and consists of lectures accompanied by suitable laboratory practice. Chemical preparations made by students are the property of the department, but students wishing to keep their own preparations may do so, on payment of the cost of the materials.

The students in the chemistry departments, whether preparing for special examinations or not, are strongly recommended to follow a systematic course of work. The following five years' curriculum is arranged with this object in view:—First year—Elementary Chemistry, Elementary Physics, Elementary Mathematics. Second year—Intermediate Inorganic Chemistry, Part I., Elementary Electricity and Magnetism, special laboratory work in Chemistry, one evening per week. Third year—Intermediate Inorganic Chemistry, Part II, Introductory Course of Organic Chemistry, Intermediate Physics, special laboratory work in Chemistry or Physics, one evening per week. Fourth year—Physical and Advanced Inorganic Chemistry, Part I, Organic Chemisty, Part Ia, Intermediate Physics, or Mechanical Drawing. Fifth year—Physical and Advanced Inorganic Chemistry, Part II, Organic Chemistry, Part Ib, an Advanced Course in Physics, or Mechanical Drawing and Design.

In addition to these courses, instruction is given in the afternoons and evenings in the methods of original research, to meet the requirements of those desiring to become candidates for the M.Sc., Ph.D., or D.Sc., degrees of the University of London. Arrangements are also made for students who wish to take the degree of M.Sc., "without thesis," and in this connection special attention is drawn to the courses dealing with coal carbonisation and petroleum products.

There are also a series of lectures on special branches of chemical analysis. Mr. W. A. Wood will lecture from 7-8 p.m. on October 14, 21, 28 and November 4, concerning the "Applications of X-ray analysis to chemical problems." "Modern applications of organic compounds to chemical analysis" will be dealt with by Mr. A. M. Ward, on November 11 and 18, from 7-8 p.m. Mr. T. G. Pearson will give a series of lecture-demonstrations on Thursday evenings, 7-8.15 p.m., commencing October 17, on micro-chemical analysis.

Chemical Congress at Brussels

Several Important Papers to be Read

THE fifteenth congress of industrial chemistry will take place at Brussels from September 22-28. The meeting, which it is hoped will bring together eminent scientists of all countries, will be under the distinquished patronage of the King of the Belgians. Members will have the opportunity of visiting all the principal chemical works and appreciating the progress made by Belgian industries. They will also take part in various excursions to some of the better known beauty spots. Both the French and Belgian railway companies are offering substantial reductions on round trip tickets. The more important papers which will be read to the congress include "Vitamins" by M. Karrer, "Recent applications of colloidal chemistry" by M. R. Dubrisay, "Production of high temperatures" by M. C. Ribaud, "Polymerisation and its several applications in industry" by S. H. I. Waterman, "Various aspects of the solubility of gas in metals" by M. C. Chaudron, and "Sexual Hormones" by M. L. Ruzicka.

Laundry Washing and Bleaching

A Valuable Handbook for the Laundry Industry

THE wide range of technical experience gained by Imperial Chemical Industries, Ltd., in the manufacture and servicing of a large number of alkali products and bleaching agents for laundry use is presented in convenient compass in "Laundry Washing and Bleaching," a 97-page handbook just published by I.C.I. at 2s. 6d. Practically every section of the work of the laundry which is concerned with actual cleaning and removal of soiling matter comes under review, from the standpoint both of the appropriate washing agents used and the most up-to-date methods of using them, and its value as a handbook is enhanced by the inclusion of more general but none the less practical sections on the scientific bases and control of washing and bleaching processes in common use.

An appropriate general discussion of this kind prefaces each of the two more specialised sections dealing respectively with washing and bleaching agents and recommendations for their use. Thus, it is not only to the more experienced launderer that it should prove useful, as a technical guide to the use of the various I.C.I. products; it should have an equal value for the student and the launderer about to set up business, since it presents in non-technical language a concise summary of the various factors which have to be accurately controlled in successful washing and bleaching, and of the methods by which this control can be effected, while to the lay reader it should give an admirable general idea of the extent to which research has progressed and been utilised in the laundry industry in the thirty years since the significant Cantor Lectures referred to in the introduction. In general, it is a constructive reminder, if such is necessary, that laundering is now an exact science, and that no progressive launderer can afford to overlook the results of research.

Water, Soap and Alkalies

In the preliminary section on the basic materials used in laundry washing processes, prominence is very rightly given to the problem of a suitable water supply. The quality of the water used in the washing and rinsing processes, more particularly in respect of iron content and impurities liable to cause staining, has tended more and more in recent years to occupy the attention of the laundry industry. A discussion of soap wastage and fabric contamination by hard waters is linked-up with a note on the Lime-Soda process of softening, with special reference to operating costs and to some of the incidental advantages which make it of special value to the laundry industry—notably its removal from the raw water of suspended matter and all except minute traces of iron compounds, as well as of organic colouring matter occasionally met with in hard surface waters. The use of sodium aluminate in conjunction with it, where it may be necessary to increase the rate of softening and to secure a still lower residual hardness, is also touched upon, and suggested lines of treatment are put forward for those classes of natural waters which do not require softening, but whose acidic and therefore corrosive properties make conditioning necessary before they can be regarded as satisfactory for laundry use.

Progress in Soap Manufacture

Simultaneously with the advance in knowledge of the main factors which influence the action of soap solutions in removing dirt from soiled fabrics, similar progress has been made in recent years in the manufacture of soap, and in the present book there is an informative section dealing with the composition, action, grades and purity of soaps, and their appropriate "titre values" for the washing of various classes of fabrics. It is known that there is a definite relationship between the solubility of a soap and the so-called "titre" of the fatty acids which it contains. The term "titre" as applied to fatty acids refers to their solidifying point, *i.e.*, it gives the temperature above which the fatty acids are in a liquid condition. The fatty acids contained in a fine oil soap have a "titre" of less than 25° C., while the corresponding figure for the fatty acids present in a soap made from tallow or other hard fats is usualy above 40° C. Soaps containing fatty acids of low "titre" are the most satisfactory for the washing of delicate fabrics because they have a high solubility at low temperatures, but at temperatures near the boiling point they are not as good detergents as soaps containing fatty acids of high "titre." The "titre" value of soaps used for woollens, silks and other delicate fabrics which must be washed at low temperatures should not exceed about 27° C. In the washing of white work, which is carried out in stages at gradually increasing temperatures, it is advisable to use soaps having "titre" values intermediate between those of an oil soap and of a soap made from a hard fat. A range of 30° C. to 35° C. may be considered satisfactory.

The rest of the preliminary section is taken up with a general discussion of the properties and composition of various alkalies and bleaching agents commonly employed in laundry processes, and an explanation of their elementary chemistry.

Relative Alkaline Strengths

The table giving the relative alkaline strengths in terms of *p*H value, of the best known soda alkalies, when used in the concentrations normally attained in laundry wash liquors, should prove of practical use to the launderer as a guide to the safe washing of high-grade fabrics. The soda alkalies used in the laundry may be regarded as derived from the strong alkaline oxide, sodium oxide. This substance, by reason of its great affinity for water, can be prepared in the fee state only with difficulty, and it is best known in the form of its compound with water, which is the strong alkali, caustic soda. Equally valuable data are given in respect of the use of bleaching agents, and of the conditions under which oxidising bleaches of the hypochlorite and perborate class should be used in the laundry, as distinct from the bleachcroft, so as to ensure a good finish without risk of tendering or stripping.

In the subsequent more specialised sections the functions and effects of alkalies and bleaching agents are treated in more detail and the effect of alkalies on acidic soiling matter, on hard water, on the detergent action of soap and on the re-deposition of soiling matter are the subjects of separate notes; similarly with bleaching agents, the methods of control of bleach liquors, and the various classes of work and other factors which determine the nature of the bleach are all dealt with in an eminently practical way. The section in which specific laundry alkalies and the properties of their available commercial forms are dealt with, show the launderer that there are other useful washing alkalies besides caustic soda and sodium carbonate which have claims on his attention, more particularly for the washing of delicate fabrics at low temperatures, and cases are cited in which comparatively recently-developed commercial forms, such as "Crex," might be of special utility.

A Discussion of Laundry Washing Processes

The largest and perhaps most informative section of the book is taken up with a detailed discussion of the scientific bases of efficient washing and bleaching, and indicates how the reagents whose properties have been summarised in the preceding sections may be utilised to the best advantage under practical conditions. Methods of ensuring accurate control of such important factors as the temperature and alkaline strength of the liquors used for the breakdown, the washes and boil, and the rinses, as well as of the degree of loading and the "dip," are concisely summarised, and various modifications are suggested to meet particular conditions. The weight of goods in the machine, and the volume of the wash liquors at the various stages, are factors of importance in the control of the washing process. The washing machine should be fitted with a reliable dip gauge in order that the volume of liquor in the machine may be approximately known. The load should be about 3½ to 4 lb. per cubic foot of cage capacity, and should not exceed the latter figure except in the case of very slightly soiled work. For heavily soiled work the load should not exceed 3½ lb. per cubic foot. It should be borne in mind that the important factor in determining the efficiency of the detergent action is not the

total quantity of reagents introduced into the machine, but their concentrations in the liquor. A notably practical feature is a separate section giving precise details of a typical washing and bleaching process for white work.

Coloured goods, woollens, natural silk and rayon fabrics are all considered in turn, whilst a final section deals with special reagents for use in the laundry, and outlines the nature and uses of solvent soaps and wetting agents. An important factor in the efficient washing of textile fabrics is the thorough wetting of the material in order to loosen the soiling matter. Satisfactory wetting is usually obtained when alkali-soap liquors are employed, but if the articles are heavily contaminated with greasy impurities, especially when old starch is present in considerable amount, it may be advantageous to add a special wetting agent, in order to assist the removal of the soiling matter from the fabrics. In recent years various complex organic compounds have been prepared, which have a marked effect in increasing the wetting power of aqueous solutions, and these compounds may be usefully employed in a laundry. There is also a useful list of the laundry products referred to in the book, giving grades of purity and standard types of packing.

Manchester Tackles the Smoke Problem

Some Municipal Recommendations

THE Journal of the National Smoke Abatement Society for August publishes a summary of a report recently presented to the Manchester Corporation by a sub-committee appointed to consider and report upon the desirability and practicability of making available to the public smokeless fuels, including gas and electricity, at such cost (not including a charge upon the rates) in relation to raw coals as will permit their use in preference to coal, and thus make a definite contribution to a cleaner atmosphere.

The report states that the Manchester Gas Department is taking many practical steps to encourage the use of gas as an alternative to raw coal in the cause of smoke abatement. In the domestic sphere, where the household chimney is one of the chief causes of smoke pollution, every effort is being made to increase the use of gas appliances. The industrial uses of gas are becoming more and more recognised by the manufacturer, and in order to meet his requirements on technical problems an industrial gas demonstration centre has been set up in Manchester jointly by various gas undertakers in East Lancashire (including the Manchester Corporation) to collect, tabulate, and circulate information on the various processes to which gas has been put in all classes of trades, and to experiment and conduct research into new methods of using gas for industrial and commercial purposes.

What Gas and Electricity are Doing

The contribution which gas is making to smoke abatement is substantial. On the question of the cost of gas as against coal this is mainly determined by individual consumers' requirements, but no claim is made that if a gas fire is in constant use during the day it is cheaper than an open fire Other factors besides that of cost (labour saving for instance) are usually considered when decisions are made to use gas in preference to coal.

The use of electricity in Manchester is popularised by the adoption of such measures as cheap tariffs, hire and hire-purchase of appliances, prepaid wiring and assisted wiring schemes as well as exhibitions and demonstrating the use of electrical methods and appliances in industry and the home, lectures, advertising. showroom displays, and similar propaganda. From time to time, as circumstances warrant, progressive reductions are made in the charges for energy and hire of apparatus. Electricity, like gas, is making a substantial contribution towards smoke abatement, but again, as in the case of gas, no claim is made for electricity that if a radiator is in constant use during the day it is cheaper than an open grate fire.

The greatest contribution made by electricity to smoke abatement is in its displacement of and substitution for small private power plants used for industrial purposes. Except when operating large condensing engines and turbines under very favourable conditions the small steam-power plant is definitely uneconomical and is rapidly being replaced by electric motors or other power units, which do not appreciably cause pollution of the atmosphere. In 1933 nearly 85 per cent. of the power used by industry in Manchester, amounting to nearly 270,000 horse-power, was supplied in the form of purchased electricity. Of the balance, approximately 50,000 horse-power, rather less than half, can be looked upon as potential black-smoke-producing plant. It may be assumed that the smoke nuisance due to privately-operated steam-power plant will, in a few years' time, in this area be reduced to negligible proportions.

The gas department supplied last year over 26,000 tons of coke for domestic use. Twice this quantity can be supplied without interfering with the local industrial requirements. If additional supplies of coke are required it will be necessary to have a combined policy for the sale of gas and coke.

Mr. Arnold Marsh, general secretary of the National Smoke Abatement Society, contributes some notes on low temperature carbonisation, which are printed as an appendix to this report. Those notes refer to certain processes now on the market, or on the point of being marketed.

Findings of the Sub-Committee

The recommendations of the sub-committee are as follows: (1) That the housing committee be instructed by the council as an experiment to make provision, say, in fifty corporation houses for grates to be specially adapted to burn coke instead of coal, and to arrange that for a period of twelve months coke supplied by the gas department shall be burned in such houses instead of coal. Further, to instruct the housing committee at the expiration of the twelve months' period to report to the council upon the results of the experiment from the point of view of efficiency and economy. (2) That the town hall committee be instructed by the council to carry out in such offices within the Town Hall, as may be found suitable for the purpose, experiments both with the ordinary coke as supplied by the gas department, and low temperature fuels supplied by outside firms, and report to the council the results of the experiments after they have been in operation for a periol of twelve months. (3) That the gas committee be instructed to consider the question of the installation of a plant to produce low temperature carbonisation fuel and report to the council on the subject, both from the economic aspect and also from the point of view of stimulating the use of smokeless fuel in the city.

The sub-committee also appeals to the public generally to experiment with smokeless fuels.

As and when the public show their appreciation of smokeless fuels supplies will be increased. At present, if the demand were general there would, of course, be nothing like sufficient supplies available. Any suggestion, therefore, to introduce an element of compulsion in the use of smokeless fuels in substitution for raw coal is out of the question. The time to consider that aspect of the subject may arise when smokeless fuels can be obtained from distributors in the streets as readily as coal is otained to-day.

TWO descaling fluids, for the removal of deposits of scale from hot water systems, will be shown by Clensol, Ltd., at the Shipping, Engineering and Machinery Exhibition. They are "Noricene," a product of Imperial Chemical Industries, Ltd., sold and serviced by Clensol, Ltd., and "Clensol." Both of these products are only suitable for the descaling of plant which is out of commission. For the reduction of deposit, "Clensol" boiler water purifier, the treatment is a simple and inexpensive alternative to the scaling and chipping of boilers. Bricks weighing 4 lb., guaranteed not to contain any acids or caustic soda, are introduced into the feed water and pumped into the boilers through the hot-well or tank. While they are continuously softening and removing existing scale they also prevent the formation of fresh deposits and eliminate corrosion and pitting.

Oil Refining Progress in Great Britain

Lincolnshire Refinery Nearing Completion

PRESIDING at the first ordinary general meeting of Herbert Green and Co., Ltd., at Thames House, Millbank, on August 23, Mr. Herbert Green, chairman and managing director, announced that the company's new refinery at East Halton, Lincolnshire, was approaching completion. After dealing with the balance sheet covering the period to June 30, Mr. Green said that early in the construction period a systematic plan of work was made and a large area laid out as a reconditioning department. By this means pumps, valves, pipelines, compressors and other equipment taken over were tuned up, tested, classified and made ready for use by the erection staff, who had worked them into the general scheme. Many of the larger units required no rearrangement, the layout of the refinery being already planned on such economical lines that the larger items could be employed with the least possible outlay. All the existing storage and run-down tanks had been thoroughly cleaned and overhauled, and were now ready for service.

A Triumph of British Workmanship

Since the date of the balance sheet many large items of equipment had been received and were now in position. No fewer than 68 wagon-loads of machinery arrived at the private sidings during the August Bank Holiday week-end. This had enabled them to speed up the programme of construction, and at the present time upwards of 700 men were engaged at the refinery. The company's orders for plant and equipment were placed in ample time for delivery to be made on agreed dates, but it so happened that the issuing of instructions coincided with the welcome increase in the prosperity of the steel and engineering industries throughout the country, and their suppliers were placed in the predicament of having accepted contracts which they found it difficult to fulfil on time largely owing to a shortage of skilled labour. Chemical engineering had reached such a high degree of technical efficiency that in many cases only men of specialised experience could operate the machinery. To illustrate the type of skilled workmanship which had gone towards the manufacture of their equipment, Mr. Green said they were now in possession of a fractionating tower that was a veritable triumph of British electrical welding. This tower is 60 ft. high, 9 ft. 6 in. in diameter, weighs 53 tons, and is in one piece A lorry, itself weighing no less than 23 tons, took a fortnight to convey this giant by road from Birmingham to the refinery at East Halton, as it could only travel at the rate of five miles per hour, and many difficulties were experienced in transit.

The Importance of Home Refining

It was hardly possible to overrate the significance and importance of the home refining of oil, as up to the present time it had been done on a small scale in comparison with the total amount of oil consumed. The value of our annual importation of foreign lubricating oils amounted to nearly £4,000,000, so it would be appreciated that this sum represented the employment in other countries of large amounts of capital and labour. By the establishment of the refinery at East Halton, which occupies 53 acres, they had already done much to lessen the burden of unemployment in and around Hull and Grimsby. Apart from the 700 men directly employed at one time on the site, they had indirectly given employment to a much greater number by reason of orders for machinery and equipment placed with British firms Specialised plant, such as theirs, called for the highest quality of workmanship and materials, and, as coal and steel played important parts in the preparation of these materials, they had contributed widely to national industrial activities by their enterprise.

Apart from these advantages to manufacturers and labour, the establishment of the Duo-Sol refinery represented a real attempt to put Great Britain on an equal footing with other countries as regards oil refining. In 1932 France doubled her output of home-refined oils as compared with 1931, and, having steadily increased her capacity since then, she would shortly be able to treat annually more than 4,500,000 tons of crude oil, thus satisfying her entire refined petroleum requirements herself and reaping substantial benefits therefrom. Italy and Germany had also considered it to be of national importance to organise home refining industries and were making great progress with the approval and protection of their respective Governments.

"It is my strong belief," continued Mr. Green, "that the time has now arrived when we in Great Britain should make a definite and co-ordinated effort to free ourselves from dependence upon imported supplies of finished lubricants. No one who has studied the trend of international affairs can seriously challenge the wisdom of doing everything practicable to produce home-refined oil products, especially lubricating oil. Just how important this is you will realise when I remind you that the lubricating oil at present supplied to the British Air Ministry is of Russian origin and refined in that country. The reason given by our Government for its decision to buy Russian oil was to the effect that none could be found within the Empire to comply with the Ministry's specification, and it is therefore a pleasure for me to inform you that the Duo-Sol process will enable us to produce a lubricating oil that will satisfy the exacting requirements of the British Air Ministry and other Government services. In view of the present expansion of the Royal Air Force and the general increase in civil aviation, our dependence upon foreign supplies of oil would appear to be of doubtful wisdom, and it is very regrettable that a recent attempt to institute a Government inquiry on the subject of home refining met with no success."

All-British Enterprise

In his reply to a question asked last June in the House of Commons and Chancellor of the Exchequer said: "As at present advised, I do not consider that the comparatively small increase in employment which would be likely to result from the adoption of the policy suggested would be sufficient to counter-balance its disadvantages on other grounds." In spite of this rather uncompromising statement by the Chancellor, Mr. Green was of the opinion that the company's effort to establish a home refining industry would not go unnoticed, and would have its reward in the gradual realisation by the Government of the importance of their pioneer work.

The enterprise was all-British, and it seemed not unreasonable to hope that the Government would, in the near future, recognise the desirability of fostering the refining of lubricating oil in this country, and might even follow the example of those European Governments to which he had alluded and grant some preference to British-refined oil. He fully appreciated that their present capacity of 40,000 tons per annum was only a small proportion of the total of 500,000 tons consumed, of which no less than 420,000 tons were imported from foreign countries. It might seem presumption on his part to offer his opinion uninvited when their refinery had not yet started to operate, but he was so strongly convinced of the importance of the subject that he preferred to attract criticism by over emphasis rather than escape notice by under-statement of the case.

Britain's Oil Reserves

Nobody knew with certainty the answer to the question "What oil reserves are kept in Great Britain?" But he could not do better than refer to the statement made by the Duke of Montrose in July of last year during a debate in the House of Lords on the subject of Britain's oil policy. His Grace said he was informed that at any given time then there was not more than three weeks' supply of oil in this country. His statement was not refuted, and Mr. Green felt he need make no further comment upon it than to express the earnest hope that such a lamentable condition had been rectified during the intervening 12 months. A new home development of marked importance also deserved mention. He referred to indigenous resources of crude petroleum that, under legislative sanction, were about to be exploited. The British Government had received upwards of 43 applications for licences for extensive boring operations in various parts of Great Britain. These licences would be taken out by responsible industrial groups as the result of extended geological and

kindred surveys made by men with scientific knowledge and experience gained in other oil-bearing lands. It was obvious that these groups were satisfied, after careful inquiry, that the yields of crude oil were sufficient to warrant the capital expenditure involved, and from this source they would consequently anticipate further potential supplies and customers for their refining operations.

As not all holders of British licences to drill for oil had, or would have, available the necessary refining plant, it would seem that their company would be admirably qualified to assist them, and by so doing prove to be helpful to all concerned.

Petroleum Lubricants

Petroleum lubricants had played an indispensable part in the mechanical development of the past three-quarters of a century. Almost every mechanical device used to-day not only employed petroleum lubricating oil in its operation, but its development was made possible only through the discovery of suitable lubricants. Wherever friction was encountered lubrication was essential, and the modern world without petroleum lubricants was almost inconceivable. In reviewing the advances made in petroleum technology during the past three or four years, it was obvious that first place must be given to the progress made in methods of refining in order to meet the ever-growing demand for superior products. Revolutionary changes had been made in engine design, and such developments had brought about increased compression ratios, greater bearing pressures, advanced speeds, higher temperatures, and other mechanical changes, all of which had forced the refiner to provide suitable oils to meet these exacting requirements.

The Duo-Sol process had established a new technique in the method of refining lubricating oil. The process was the result of many years of intensive scientific research and the application of sound chemical engineering principles. The circumstances leading to the development of the process arose out of the fact that no single crude oil refined by methods in common use could be made to yield lubricants possessing all the properties desirable in a superior oil. Now, through the medium of the Duo-Sol selective solvent refining process, it was possible to separate completely the undesirable constituents from any crude. It introduced a new principle to effect a separation of the asphaltic from the paraffinic constituents of the oil by employing two immiscible solvents that passed in counter-current fashion through a stream of crude oil. Large scale commercial plants incorporating the Duo-Sol process were now functioning in America, and their company had had the benefit of their actual experience and had taken advantage of all the specialised knowledge gained from their extensive operations. In every instance these plants were working successfully, every guarantee as to capacity and quality of oil being fulfilled and in some cases surpassed.

Attaining Further Efficiency

It was only to be expected that experience gained in the construction and operation of these installations had pointed the way to further efficiency and economical improvements, which were being incorporated at the company's refinery, and the directors felt confident that the adoption of this valuable process would enable the company to produce the best lubricating oil ever refined in Great Britain. Their plant embodied the latest developments in the art of refining, economy of operation, convenience of control by automatic devices and maximum earning capacity. They had entered into a contract with the Grimsby Corporation for the necessary supply of electrical energy.

The company had acquired a licence from the Texaco Co of New York to operate a double-solvent process for the purpose of dewaxing lubricating oil after it had been run through the Duo-Sol system. This special dewaxing process had advantages not available by any other method, and was capable of producing a larger percentage of dewaxed oil and, consequently, a paraffin wax of higher melting-point than any previously attained. A large market existed for paraffin wax. According to the Board of Trade Returns for 1934, Great Britain imported 50,820 tons, having a value of £1,037,000. The refining of paraffin wax had been developed mainly abroad; it was utilised largely by the candle industry, and in the development of other industries vast quantities of it were required. It was used to make some materials waterproof, such as wrapping paper, wood, leather, cardboard containers, boot polish, butter boxes, and coating of cheeses. Wax was used to increase the inflammability of the match stick, and the electrical industry was gradually extending its employment for insulating purposes. The directors felt assured of additional revenue from the sale of their paraffin wax by-product for which this large market existed and inquiries had already been received from prospective customers.

An important matter which had received the special and continuous attention of the directors had been the supply of crude oil charging stocks. Contracts had been entered into which assured the company of regular supplies at satisfactory prices. It should be remembered that they imported crude oil in bulk—one single product requiring one type of transport and one type of storage—thus economy was effected from the outset. Another important point was that the refinery would not need to carry large stocks of finished lubricating oil; its output would be absorbed continuously, and it would therefore be in a much better position to adjust its operations to suit home market outlets than a refinery situated abroad. As for export trade to British Colonies, the company would enjoy the advantages of existing preferential tariffs because it could supply 100 per cent. British-refined lubricating oil.

Dr. E. F. Armstrong, in seconding the adoption of the report and accounts, said that the works had been erected much more quickly than he had anticipated, and the most careful thought had been applied to everything. The bringing of the plant to its present stage had involved a quite unusual amount of work, and he thought that the fact that they had done it so quickly was almost entirely due to the indefatigable courage, energy, and persistence of the chairman. He (the speaker) had recently been to America to see the three plants which had preceded theirs, and had come home more than ever convinced of the wisdom of their choice.

Chlorosis in Fruit Trees

Injection Experiments at Long Ashton

THE Fruit Research Station at Long Ashton is carrying out a series of experiments on the control of lime-induced chlorosis to which apples, plums and pears are particularly susceptible. The chief line of research has been with ferric citrate. These iron salts are injected into the trees and so far give promise of producing good results. These experiments are really a continuation of investigations which took place in 1928 and 1929 to obtain control over this trouble by means of cover crops and permanent grass. Such cultural methods, however, are often neither possible nor desirable, especially in plantations where the ground is used for cover crops, and for fruits like plums which prefer to be grown, and give best results, a good many feet above sea-level.

These facts being taken into consideration, it is obvious that other methods of control must be sought out in cases of this kind. J. P. Bennett discovered and developed a method (" The Treatment of Lime-Induced Chlorosis with Iron Salts ") mainly from his experience with pear trees and he states that " about 75,000 pear trees have been successfully treated by the method, mostly by the growers themselves." Bennett's method is to inject various amounts of powdered citrate of iron (either ferrous or ferric citrate) into the wood of the trunk or branches of affected trees. He gauges the dose required by measuring the diameter of the trunk or branch to be treated. A brace and bit are employed to bore the holes, the calculated dose is inserted and the aperture plugged up with grafting wax. The dormant season is by far the best time for the treatment since the risk of damage at this time of year is at a minimum. Unfortunately, although the injection always causes an improvement to the tree under treatment, it effects no permanent good and at the end of three years it is necessary to repeat the performance.

Dr. T. Wallace is trying out Mr. Bennett's results at Long Ashton. Ferric citrate, purchased as " scales," and then ground to fine powder, were employed in his experiments. Research work was carried out at four centres in the counties of Somerset and Worcester on apples, plums and pears, the treated trees in each instance being severely affected by chlorosis and in very poor condition. The injections were made in March, 1933, immediately prior to buds bursting, and records on the condition of the trees are available for 1932, 1933, 1934. The results obtained are similar to those described by Bennett and indicate that the method may be of considerable commercial value.

Chemical Problems in America

Papers read before the American Chemical Society

SEVERAL papers of unusual interest were read before the Division of Industrial and Engineering Chemistry at the 90th meeting of the American Chemical Society, at San Franvisco, August 19 to 23.

In their paper on "Reclaiming of Chlorinated Dry Cleaning Solvents by Adsorption," L. E. Stout and A. B. Tillman said dry-cleaning solvents accumulate a variety of oils during use. These oils may be classified into polar and non-polar substances. Acids and saponifiable materials are detrimental to the continued use of the solvent while mineral oils in moderate concentrations are even beneficial. Commercial practice calls for periodic removal of these oily residues by distillation of the azeotropic mixture of carbon tetrachloride and ethylene dichloride. The substitution of a combination of adsorption and filtration for this distillation process has been recommended from time to time, but many men in the industry feel that insufficient performance data are available to justify such a procedure on high-class work. This paper evaluated the adsorptive properties of three materials when used in such a dry-cleaning cycle. Silica gel is an excellent general adsorbent but does not seem selective for polar substances. Activated carbon and specially treated magnesia are both selective in removing, preferentially, the undesirable constituents. By use of these agents the solvent cycle of use can be extended enormously. A determination of the acid number of the solvent is an excellent index of the usability of the solvent for further cleaning.

Utilisation of Alunite

The "Utilisation of Alunite Through Fusion with Alkali Sulphides" was the subject of a paper by E. O. Huffman and F. K. Cameron. Alunite fused with sodium sulphide or a mixture of sodium sulphate, and coal, gives a melt from which alumina and sodium carbonate can be recovered, together with a potassium salt mixture available for use as a fertiliser. Alunite fused with potassium sulphide, or a mixture of potassium sulphate and coal, gives a melt from which alumina and a pure potassium sulphate or carbonate is readily recovered.

Dealing with "Submerged Combustion Heating in the Separation of Potassium Chloride from Sylvinite," K. A. Kobe and R. P. Graham said present practice in the recovery of KCl from sylvinite uses steam to heat the saturated solution to boiling. Submerged combustion of gas in a solution saturated with KCl and NaCl has been shown to be successful when a sharp-edged orifice is used for the products of combustion. This allows natural gas to be used directly for KCl recovery with greatly increased thermal efficiency. The boiling point of the solution by submerged combustion is reduced to 90° C., which decreases the recovery to 80 per cent of that at 180° C. The air lift action of the gases released in the solution allows the circulating pump to be removed.

Vacuum Method of Refrigeration

In his paper on "Some Technical Considerations of the Vacuum Method of Refrigeration," D. H. Jackson gave a brief history of the process of chilling liquids by partial evaporation under very high vacuum, with reasons for the recent wide commercial application of this process which has been known for many decades but has been considered practical only in very recent years when improvements in vacuum equipment have brought down both the first cost and operating cost. The steam jet type of vacuum apparatus for applying the process was described in detail. In addition to curves and photographs, eight different sets of curves gave actual operating data with figures for steam and water consumption at different chilled water temperatures and with different temperatures of condenser water. The curves were arranged for convenient selection of the optimum combination of steam and condenser water for different conditions. The discussion covered vacuum cooling of liquids by direct exposure to vacuum and also by an indirect method with a heat exchange bundle submerged in chilled water in the vacuum chamber. Both continuous and batch cooling were discussed with mention of operating economies provided by the batch method.

Studies in the "Removal of Silica from Solution at Boiler Temperatures" (182° and 282° C.) by the addition of calcium and magnesium and aluminium compopunds were described by F. G. Straub. When magnesium oxide is present in excess the SiO_2 content of the water is less than 0.10 millimole per litre. When sodium aluminate is present along with the magnesium this solubility is less than .05 millimole per litre. High concentrations (45 millimoles per litre) of sodium hydroxide does not increase the solubility of the silica.

The dispersion of phenolic resins in a non-solvent makes possible the practical application of these products as glues for waterproof, weatherproof and vermin-proof plywood, said L. A. Sontag and A. J. Norton in a paper on "Phenolic Resins as Plywood Adhesives." A glue line cost of only two to two and a half times that of the cheapest vegetable glue is obtainable. The large-scale production of panels to replace lumber in outdoor construction is thus made possible. Details of production methods, and a short history of development of glues and the plywood industry, were given.

Exhibition in New York

Fifteenth Exposition of Chemical Industry

DIVERSITY and newness will be the keynotes of exhibits at the fifteenth exposition of chemical industries which will be held during the week of December 2 to 7, 1935, at Grand Central Palace, New York City. The exhibits will cover the complete range of the reconstruction period's industrial chemical interests. Appearing regularly during the past twenty years, under the same direction and with the same regulation of exhibit standards, the chemical exposition has an established attendance that is remarkable. Thousands of executives in charge of purchase, and administrative officials will attend the fifteenth exposition to estimate the areas of competition and to compare the new offerings of the producers of machines and materials as a basis for contract purchase specifications.

The planning underlying the design and construction of the exposition has been carried forward for more than a year in advance. Exhibiting companies have first to decide by process of market analysis and competitive trends what they will feature from the standpoint of sales economy and product progress. Their next step is to contract with specialists in exhibit construction, unless they have such a department of their own, to ensure that their presentation be given a pointed setting and sequence. The technique of display presentation, coupled with the furnishing of the exhibit space and suitable captioning, means the completion of only part of the problem. Chief factors still to be decided by each exhibitor are the personnel, who are selected as adapted to the important task of knowing everything about the product and meeting the purchasing public in a gracious manner, and the company literature, designed to inform and interest each important classification of the exposition's attendance.

Executives responsible for the successful marketing of a new industrial product realise that their problem deals with every movement of the merchandise from completion of manufacture to possession by the final consumer, and in the case of many products, the complete and continual servicing in use. Meeting this need, the exposition will cover not only the field of raw materials and production machinery, but will have sections devoted to material handling, packaging, bottling, labelling, up to the final marketing of chemical industrial products of every type. The plastics division will be more than ever complete and there will be a group of exhibits pertaining to the brewing and distilled spirit industries. Since chemistry and chemical engineering provide foundation and safeguards for the food and beverage industries, the exhibits of interest to these fields will be numerous and diversified.

The exposition is under the direction of Mr. Charles F. Roth, manager of the International Exposition Co.

New Technical Books

LABORATORY BOOK OF ELEMENTARY ORGANIC CHEMISTRY. By Alexander Lowy and Wilmer E. Baldwin. Chapman and Hall. 2nd edition. pp. 182. 15s. 6d. net.

The purposes of this book are to teach the technique of organic chemistry and it is intended as a book of experiments for first year medical or engineering students.

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LAUNDRY CHEMISTRY. By A. Harvey. 2nd edition. Technical Press, Ltd. pp. 118. 4s. net.

The washing of clothes does not at first sight appear to be a subject to which chemistry can easily be applied, but after reading Mr. Harvey's book it will be realised that there is much in laundry practice which is distinctly chemical. The author has assumed that his readers have no chemical knowledge and a short introduction on chemical principles has been included which should be of assistance to the layman in interpreting the equations and reactions which come later. To the laundryman who wishes to get a real understanding of the technical side of his business, this book should prove really useful.

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THE MANUFACTURE OF GAS. Vol. I. Edited by H. Hollings, M.Sc. pp. 260. Ernest Benn, Ltd. 36s. net.

This volume is the first of a series of three, the other two being "Gas Purification" and "Coal Carbonisation." In "The Manufacture of Gas" the subject dealt with is water-gas. There is an urgent demand for a text-book upon this branch of gas technology and Mr. Hollings' book should go a long way towards meeting this demand. In connection with the chemistry of the water-gas process and also that of the oil cracking process a great deal of valuable knowledge has become available within recent years. It is, however, in so scattered a form that it is often inaccessible. Furthermore, during the last decade striking advances have been made in the design of plant and in many details of works technique. The aim in this book is to present a complete picture of the scientific foundations of the processes of coke gasification and oil cracking, and then to show how the fundamental data thus made available may be linked up with a large-scale practice. A large amount of the information has been obtained from the Gas Light and Coke Co..

The fundamental considerations affecting the reactions between carbon and oxygen or steam are of very wide application, and the more theoretical sections of this volume also form an introduction to the treatment of the coal-carbonisation process in Volume III.

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THE APPLICATION OF ABSORPTION SPECTRA TO THE STUDY OF VITAMINS AND HORMONES. By R. A. Morton, D.Sc., Ph.D., F.I.C. Adam Hilger, Ltd., pp. 70. 10s. net.

Studies in absorption spectra interest chemists from many different points of view. Applied to diatomic molecules, they yield valuable information on the intimate structure of the molecules, so that moments of inertia, internuclear distances, valency vibrations, valency angles and characteristic frequencies may be deduced. In the large polyatomic molecules with which Mr. Morton's book deals, information of such precision is out of the question. Spectroscopic research in this field is much more empirical, and its value lies in its use as an adjunct to biochemical and organic methods of study. In spite, however, of this serious limitation, the author deals very thoroughly with the fact that the recent developments in knowledge concerning physiologically active substances owe much to spectral absorption curves, in the two directions of elucidating photo-chemical changes and in providing characteristic "labels" for the substances the existence or importance of which rests on biological methods of experimentation. Vitamin research must always accept the animal test as the first and last court of appeal; the main service of absorption spectra lies in the possibility (which may not, of course, always eventuate) of supplementing the physiological description of an X substance by means of a physical criterion capable of aiding in identification and analysis.

AN INTRODUCTION TO THE MODERN THEORY OF VALENCY. By J. C. Speakman, M.Sc., Ph.D. Edward Arnold and Co. pp. 157. 4s. 6d. net.

The electronic theory of valency is now so well established, and its ramifications extend so widely, that those who wish to study chemistry seriously must of necessity build their knowledge on the foundation of a sound knowledge of this subject. Unfortunately most text-books have treated it as an amusing hypothesis instead of as a fundamental theory. Mr. Speakman's book forms an excellent bridge to this gap and students for degrees should obtain a great deal of help from it. The text falls into two parts: in the first five chapters a very elementary sketch of the electronic theory is given; in five later chapters the more immediate applications and implications of the theory are suggested, in a less elementary style. The outlines of the manner in which wave mechanics apply to valency problems are also included.

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THE TESTING OF BITUMINOUS MIXTURES. By D. C. Broome, F.C.S., M.Inst.P.T. Edward Arnold and Co. pp. 194. 15s. net.

Mr. Broome's book is Vol. II of the "Roadmakers' Library" and is designed as a laboratory manual for the use of those called upon to carry out tests upon bituminous road and building materials, and their constituents. Many of the tests upon bitumens and tars are well known, and have been standardised by the Institution of Petroleum Technologists or by the Standardisation of Tar Products Tests Committee; these have been dealt with quite briefly. However, where details of a test are not readily available, all essential information has been included. In somes cases alternative methods of test are described, and this has been done as the best method for one sample is not necessarily the best for another sample of somewhat different characteristics. Further, wherever attention to original literature may be useful to those wishing the fullest information upon a particular test, adequate references have been inserted.

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SILICA GEL AND BLEACHING EARTHS (Das Kieselsäuregel und die Bleicherden). By Dr. Oscar Kausch. Berlin: Julius Springer. RM. 26.10.

SUPPLEMENTARY VOLUME, SILICA GEL AND BLEACHING EARTHS (Ergänzungsband zu "Das Kieselsäuregel und die Bleicherden"). By Dr. Oscar Kausch. Berlin: Julius Springer. RM. 12.

It may be supposed in a country where bleaching earths (fuller's earths) were first found and employed, and which had for a time the greatest export in the world for fuller's earths, that there would be a specially big interest for "Silica Gel and Bleaching Earths." Therefore the supplementary volume just published by Dr. Oscar Pausch, on these subjects, is of great interest and very much to be welcomed. This new publication is, however, to such an extent a continuation and a completion of the first chief volume that it seems expedient to review both books together as one important work. The requirements of the chemical industry in means of absorption of all kinds has increased continually. The necessity of separating single constituents from mixed substances is a daily occurrence in every chemical laboratory and every chemical factory. Silica gel and bleaching earths possess this ability to a great extent and are employed in the most varied ways as means of refining and clarifying. Therefore, in the course of time a very extensive literature has sprung up corresponding to the exceptionally big and still-increasing significance of silica gel for the chemical industry. This literature appears in so many different papers that it is hard to find. Dr. Bausch has undertaken to bring out a monograph summarising both fields and to present the very scattered literature which he has collected in a form easy to survey and well arranged. In this the author has succeeded exceptionally well. After a short introduction on principle the chief volume and the supplementary volume both deals with the properties and manufacture of silica gel, the patented processes for the manufacture of silica gel, the use of silica gel, clays, fuller's earths, kambara earths (Japan), filtrol, magnesium hydrosilicates, German bleaching earths, patented processes for the manufacture of active

bleaching earths, the use of bleaching earths for decolorising fats and oils as well as waxes, the patented processes for the bleaching of oils, fats, fish oils, wax, etc., by means of bleaching earths, and the recovery of silica gel and bleaching earths and the relative patents.

Both volumes close with an aqually excellent and typical bibliography, patent lists, lists of names and index. Whoever is convinced that technical books are not only to be read, but are just as much (or perhaps even more) for reference, will be specially pleased with these outstandingly good indexes.

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A SUMMARY OF FOOD LAWS AND REGULATIONS. By C. L. Hinton, F.I.C. pp. 89. Nema Press, Ltd. 21s. net.

Mr. Hinton's book will supply a long-felt need both for the public and for the manufacturer. The whole world during the past few years has been tightening up its food laws in order to protect the consumer. Regulations have been laid down, or are being worked out, for articles which have not previously been subject to close control: the process is beneficial all round. The public gains by having greater guarantee of the quality of its purchases; the food control authorities are more sure of their ground in dealing with defective products; the manufacturer finds it an advantage to have defined for him the standard of article required, and perhaps to know that he is better protected from the competition of inferior products pretending to a quality they do not possess. The most irksome part of this new movement towards greater regulation, as far as the exporting manufacturer is concerned, is that there are so many different schemes being set up to cover more or less the same ground. Each separate state goes nobly ahead with its regulating, often ignoring the fact that other states round about are doing the same thing in a rather different way. The result for the manufacturer is a bewildering array of requirements and restrictions which have a strongly deterrent effect on the development or extension of export business. This is where Mr. Hinton's work will prove so useful. The book falls into two parts. The first half deals with the regulations concerning milk products and cheese; biscuits, cakes, pastry; sugar confectionery; cocoa and chocolate; jams, preserves and jellies; canned fruits and vegetables; canned and potted meats; pickles, sauces, etc.; non-alcoholic beverages; labelling; preservatives; colouring matters. This half is completed by the addition of two sections, one on legislation of the United Kingdom as affecting the manufacture of foods, and another on the required standards for jam of the Food Manufacturers' Federation. Both these sections are extremely lucidly written and should prove of inestimable value to manufacturers.

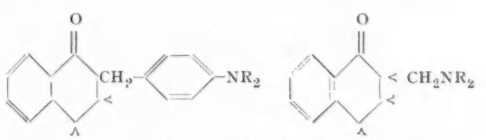
The second half consists of a large series of tables of the most important countries and against them are tabulated the various minima and standards required by their own legislation. These tables contain a wealth of easily accessible information.

Condensation Reactions of Cyclic Ketones

By WILBER OTIS TEETERS

An abstract of a thesis submitted in partial fulfilment of the requirements for the degree of Doctors of Philosophy in Chemistry in the Graduate School of the University of Illinois, 1935

SYSTEMATIC investigations in an attempt to produce desirable substitutes for morphine have been reported. [1 2] In addition to the phenanthrene and diphenylene oxide nuclei present in morphine, the substituted tetrahydronaphthalene ring system is also present. Comparatively few compounds of this nature have been prepared and studied for their therapeutic value. Two series of substituted tetrahydronaphthalenes have been prepared :—



I R=CH_3; CH_2CH_3; $CH_2CH_2CH_3$. II R=CH_3; CH_2CH_3; C_5H_{10}.

The compounds in Series I were prepared by condensation of *a*-tetralone with the p-dialkylaminobenzaldehyde and subsequent reduction. The reduction of the dimethylamino compound to the secondary alcohol resulted in the formation of two asymmetric carbon atoms in the molecule. Hence, two diastereoisomeric forms were produced and separated and they were tested separately for their therapeutic value. Both forms exhibited a local anesthetic action by injection, but only one of the forms produced surface anesthesia. This is an example of a physiological difference caused by a difference of configuration in the molecule. None of the compounds in this series exhibited a morphine-like action.

The Mannich[3] reaction, involving *a*-tetralone, formaldehyde and a secondary amine hydrochloride, was used to produce the beta amino ketones of Series II. The dimethylamino and piperidino compounds were reduced to the amino alcohols which could only be isolated in one form. Preliminary tests show that the amino ketones as well as the amino alcohols possess some physiological activity.

For the preparation of Series I, one mole of the p-dialkylaminobenzaldehyde was condensed in aqueous-alcoholic sodium hydroxide with one mole of *a*-tetralone. The condensation product was reduced with platinum oxide to give the corresponding saturated ketone. When Raney nickel was used to reduce the dimethylamino condensation product the saturated alcohol was obtained. The diastereoisomers were separated by recrystallisation from ligroin. The "alpha" form was a solid, m.p., 100°, and the "beta" form was a red oil.

In the case of Series II, molar quantities of *a*-tetralone and the secondary amine hydrochloride and an excess of paraformaldehyde were refluxed for three hours in absolute alcohol. The solution was filtered and the hydrochloride crystallised either by cooling the alcoholic filtrate or by concentrating and then cooling. The crude hydrochlorides were purified by dissolving in absolute alcohol and adding a small amount of ether and chilling thoroughly. The amino ketone hydrochlorides were reduced with platinum oxide as the catalyst. There was no indication of the presence of two diastereoisomeric forms.

Three conclusions were drawn from this book: (1) The alicyclic *β*-(p-dialkylamino) benzal- and the alicyclic *β*-(p-dialkylamino) benzyl-*a*-ketotetrahydronaphthalene compounds (Series I) exhibited no morphine-like action. (2) Alicyclic *β*-(p-dimethylamino) benzyl-*a*-hydroxytetrahydronaphthalene existed in two stereoisomeric forms which were separated; both forms caused anesthesia when injected subcutaneously, but only one form possessed the propertly of producing surface anesthesia. This is an example of therapeutic difference caused by a difference in the configuration of the molecule. (3) Preliminary tests with the alicyclic *β*-dialkylaminomethyl-*a*-keto- and *a*-hydroxytetrahydronaphthalene compounds (Series II) show that these compounds have some physiological activity.

Bibliography

[1] Edmunds, Eddy and Small, "Journ, Am. Med. Assoc.," 1934, *103*, 1417.
[2] Eddy, "J. Pharmacol.," 1933, *48*, 183.
[3] Mannich, "Arch. Pharm.," 1917, *255*, 261.

CHILEAN iodine exports during 1934 registered a 300 per cent. gain over 1933, from 119,204 kg. to 481,897 kg. Exports for 1934 were 101,654 kg. more than production. While the United States was the only market of note during 1933, taking 118,450 kg., Germany with 181,896 and France with 24,070 appear on the 1934 list, with the United States credited with 274,930.

Botulism from Bottled Food

Three Deaths in London

A CORONER'S jury at St. Pancras, on August 23, found that three women had died from botulism as the result of eating nut meat brawn and added a rider that under present regulations there was no neglect on the part of the manufacturers of the brawn.

Dr. Percival Pritchard, Medical Officer of Health for St. Pancras, said he had gone carefully through the manufacture of the brawn, and there was nothing with which fault could be found. It was carefully prepared under hygienic conditions. Experiments appeared to show that the infection came from an organism attached to some of the vegetables used in the mixture, but which vegetable they had been unable to discover. In this particular brawn peas and carrots were used, and they were bought from Covent Garden fresh each morning. No tinned or dried food was used in the preparation. Carrots and peas had been found previously to harbour botulism organisms. Botulism was due to a germ which required certain factors. It was only found in potted or canned foods which had been closed up and allowed to stand for some time with the air completely cut off from the food inside. There had been a case in Scotland where it had been found in duck paste.

Twenty-Nine Years' Experience

Dr. Pritchard said without the knowledge possessed by the canning people in America they could not blame anyone for what was done. In California they had made a special study of this problem, but it was only filtering through to this country gradually. In America they claimed that they could can any vegetable or food without any risk of botulism, but there were 15 cases of botulism in America in 1929, a year after the regulations in California. There was every possibility of deaths of this kind recurring until such regulations or knowledge was given to the people manufacturing this and every kind of canned foods. He had found that this nut meat brawn had been made for 29 years and that no previous case of botulism had been traced in connection with it.

Mr. R. A. Beck (representing the London Chamber of Commerce) asked Dr. Pritchard whether it was true to say that no case of botulism had occurred from food canned in this country or canned food imported here.

Dr. Pritchard replied that, as far as tinned food was concerned, he knew of no case which had occurred in this country, and he had a long experience.

Mr. William Bennett Adam, Deputy Director of the University of Bristol Fruit and Vegetable Preservation Research Station, said that botulism always existed as a danger, but could be combated by perfectly simple means. These were to sterilise the cans at a temperature from about 230° F. to about 260° F. It generally took 30 to 45 minutes at a temperature of 240° F. or thereabouts. This had been common knowledge in this country for at least 20 years. America turned out from 2,000,000,000 to 3,000,000,000 cans a year and had not had one case. "We turn out from 150,000,000 to 200,000,000 cans a year," he added. "That shows that the processes applied were perfectly safe." All the vegetable canners in this country were using an absolutely safe process.

Further Evidence Unnecessary

Mr. Beck said that the evidence Mr. Adam had given in the case of fruit and vegetables could be repeated in regard to meat foods by Mr. McCara, of the British Food Manufacturers' Research Association, but the Coroner said he thought it unnecessary to call him.

Referring to botulism in his summing-up, the Coroner said it was a very rare disease and the odds against it might be in the nature of millions to one. He added that the closing of the inquest would not mark the end of the investigations to find out where the infection actually came from and that they would not be limited to vegetarian products.

In a letter to the "Yorkshire Post" on Wednesday, Mr. F. Hirst, director of the Bristol University Fruit and Vegetable Preservation Research Station, wrote:—The publicity given to the recent outbreak of botulism in bottled nut meat brawn is bound to cause some uneasiness in the minds of consumers of all classed of preserved foodstuffs, and an immediate statement of the scientific facts might clarify the present position and relieve much unnecessary apprehension. The present outbreak was not connected with canned foods packed in tins, and, as was stated by two witnesses in the evidence at the coroner's court, there has not been a single case of botulism in canned foods ever reported in England. In fairness to the canners in this country these facts should be known, as this record is one of which the industry is justifiably proud. It represents the results of much scientific research conducted in America and in England, and put into practice with great care and conscientiousness.

Since the present methods of sterilisation were recognised and adopted in America ten years ago, there have been no recorded cases of this disease from commercially-canned vegetables, although the output in the United States reached the stupendous figure of 2,000 to 3,000 million cans annually. The same processes have been adopted by English canners with the same results—namely, complete immunity from botulism. Consumers can, therefore, continue to eat their canned peas, beans, or other vegetables without fear as to their wholesomeness, and with the knowledge that the extremely rare disease of which we have recently heard so much does not occur in the canned foods packed in this country.

Phonotas v. Phonosan

Motion in the Vacation Court

ON Wednesday, in the Vacation Court, High Court of Justice, before Mr. Justice Hilbery, Phonotas Co., Ltd., moved to restrain Phonosan Co., Ltd., from carrying on business under that name. The other defendants to the motion were Mr. Andrew Johnson and Mrs. Emma Johnson, who are the promotors of the defendant company.

Mr. Graham Mould, for plaintiffs, said his clients were pioneers in carrying on business for the sale of disinfectants for fumigation of telephone apparatus and undertaking the fumigation of such apparatus.

Mr. Johnson was formerly plaintiffs' manager at Manchester, but left them and promoted the defendant company and proposed to start a business similar to that of plaintiffs. The defendants were now willing to treat the motion as the trial of the action and submit to the injunction.

Mr. Daniels, for defendants, said his clients had acted innocently in the matter, and if it had been pointed out to them before the issue of the writ, they would have changed the name complained of.

His Lordship made the order agreed between the parties.

Artificial Radium from Salt

Californian Chemist's Discovery

PROFESSOR ERNEST LAWRENCE, of the University of California, in his address to the American Chemical Society at San Francisco, on August 22, said that in his opinion it would soon be possible to produce cheap artificial radium. In his laboratory he is producing minute quantities of radio-sodium from common salt. He said that artificial radium should be produced shortly for commercial use from salt and other cheap substances such as phosphorus. The new salt-radium is formed by the atomic bombardment of salt, using high voltage electricity. Natural radium emits three forms of radiation; salt-radium only the gamma which is used for cancer treatment.

Professor Lawrence told his audience that whereas natural radium has a half life of 1,700 years, losing its intensity by half during that period, artificial radium has a half life of only a few days or hours—in the case of salt radium of about 15 hours. But he said that this brevity of life should be an advantage to the medical profession because radium-sodium could be injected into the tissues of a living person, and was destroyed in a few hours, whereas ordinary radium could not be injected because it had the power of radiating for years. It is not yet possible to estimate the cost of the new substance as a commercial proposition, but it will be far less than the cost of natural radium.

Personal Notes

DR. ERNEST LAWRENCE PECK, F.I.C., of Woodley, Wilbury Avenue, Cheam, Surrey, formerly of Inveresk, Noctorum, Birkenhead, Cheshire, left £33,375 (net personalty £30,743).

MR. WILLIAM PARK LYLE, formerly a director of Abram Lyle and Sons (now Tate and Lyle), died suddenly at Eastbourne on August 22, at the age of 82.

MR. JOHN HANCOCK, aged 70, of Resugga Green, Penwithick, Cornwall, retired on August 24, after 56 years' service with the same china clay firm. He commenced work at the age of 14 with Lovering and Co., since known as English Clays, Lovering and Pochin, and served under eight "captains."

MR. W. H. JONES will join the National Coke and Oil Co., Ltd., on September 1, as joint general manager with Mr. E. W. Brocklebank. Mr. Jones is well-known in oil refining circles in many parts of the world. For several years he has been in the London office of Universal Oil Products as chief engineer.

MR. JAMES R. HASLETT, divisional agent, Imperial Chemical Industries, Ltd., is a member of the new Transport Board, which is to take over control of all road goods and passenger services in Northern Ireland. The Board is appointed under the new Road and Railway Transport Act, which co-ordinates road and rail transport.

MR. F. LINDLEY DUFFIELD, chairman and managing director of Duffield Coal Products, Ltd., has compiled an interesting and instructive booklet on the production of motor spirit from coal.

SIR RICHARD GREGORY will address the twelfth annual conference of the Association of Special Libraries and Information Bureaux, on "Interpretation of Science." The conference, which is open to non-members, is to take place at St. John's College, Cambridge, from September 20 to 23, and details may be obtained from the secretary, 16 Russell Square, London, W.C.1.

PROFESSOR HENRY BRIGGS, the first occupant of the Chair of Mining, established at Edinburgh University in 1924, died in London on Monday. Professor Briggs, who was 52 years of age, was one of the foremost authorities on mining, and among the many offices which he held were vice-president of the Institute of Mining Engineers, President of the Royal Scottish Society of Arts, hon. member of the Institute of Mine Surveyors, hon. member of the Royal Geological Society, Professor of Mining at the Heriot-Watt College, Edinburgh, and chairman of the Oil and Coal Committee. During the war he undertook experimental work relating to trench and mine warfare, and was one of the technical advisers of the War Office. He was the inventor of mine rescue apparatus and other appliances connected with mine work.

Continental Chemical Notes

Albania

ITALIAN OIL-PROSPECTING INTERESTS have been active in the region of the River Devoli and are now believed to be planning the construction of a 72 kilometre pipeline to the coast.

Switzerland

AMONG RECENT COMPANY registrations are: Desichema A.-G., Lucerne (capital 10,000 francs, for manufacture of disinfectants and other chemical products); Fissan A.-G., Liestal (capital 5,000 frans, for manufacture of pharmaceutical and cosmetic products).

Holland

A MATCH FACTORY which should give employment to 70 workers is in course of construction in Weert (Limburg).

AN EXPLORATION COMPANY has been registered, the object of which will be to ascertain to what extent zinc and lead ore deposits exist in Southern Limburg.

Hungary

USING POTATOES AS RAW MATERIAL a lactic acid plant with a daily output capacity of about one ton (which corresponds to the requirements of the home market) is to be erected in Budafok.

A DENIAL HAS BEEN PUBLISHED in the "Pester Lloyd" of the announcement recently circulated that new bauxite deposits had been located in Csabrendeck-Tapolca district. Such deposits were actually discovered nearly 20 years ago, but were found unsuitable for exploitation.

Italy

INCREASED DEMAND IS REPORTED for the insecticides on a copper oxychloride basis manufactured by Soc. Elettrica ed Elettrochimica del caffaro.

THE PRODUCTION OF MANNA in Sicily during the 1934 season is now estimated at about 200 tons, most of which was worked up to mannitol, a product in keen demand particularly by makers of medicinal chemicals in Northern Italy. The export trade has suffered from the competition of synthetic mannitol now made in the United States. Technical mannitol was formerly used in France for making high-class stationery, but no business in this field was reported for the current year.

Esthonia

NEW DEPARTMENTS for celluloid and casein artificial horn are planned by Estico Rubber Works of Dorpat.

Jugoslavia

LAST YEAR'S BEESWAX PRODUCTION is now declared at round 550,000 kilograms, an increase of no less than 58 per cent. on the 1933 figure.

Norway

PLANT EXTENSIONS now reported to be planned by A/S Orkla Gruber will place this sulphur-producing concern in a position to work up 400,000 tons pyrites annually. The capacity of the enlarged plant will correspond to 150,000 tons sulphur.

Russia

THE ALUMINA FACTORY on the River Dnieper is now producing 90 tons aluminium oxide daily and it is planned to increase this figure to 120 tons.

A PROCESS FOR EXTRACTING RADIUM SALTS from petroleum waste liquors has been discovered by an expedition of the Moscow Institute of Rare Metals to the island of Czeleken.

GLAUCONITE FOR WATER-SOFTENING PURPOSES is now being manufactured at a factory in the Central Volga region using local shale deposits as raw material. A daily output of 2 tons is in view and costs are said to compare very favourably with those of imported glauconites. It is hoped to start work on a larger plant in the near future.

France

THE SOCIETE D'ETUDES pour la fabrication et l'emploi des Engrais Chimiques finds that cement hardening is accelerated by 20 to 30 per cent. after adding 5 to 10 per cent. sylvinite.

ON THE INITIATIVE of Soc. des Produits Refractaires et Céramiques du Nord, one of the oldest firms making acid-proof materials, a central research laboratory for investigations of corrosion-resistant materials has been established.

ROSIN IS NOW BEING USED to an increasing extent in soap manufacture owing to the rise in price of vegetable oils and tallow. With the approval of the Ministry of Agriculture, the permissible content of rosin in soaps has been increased from 5 to 8 per cent., which should be reflected in a 4,000 to 5,000 tons annual increase in rosin consumption.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THERE are no price changes to report in the markets for general heavy chemicals, rubber chemicals, wood distillation products, coal tar products, pharmaceutical and photographic chemicals, perfumery chemicals and intermediates. In the essential oils market there have been slight changes in the prices of lemongrass and peppermint. Unless otherwise stated the prices below cover fair quantities net and naked at sellers' works.

Price Changes

Essential Oils.—LEMONGRASS, 3s. per lb. (against 3s. 3d.); PEPPERMINT, Japanese, 4s. 6d. (against 4s. 3d.), Wayne County, 10s. 6d. (against 11s.).

All other prices remain unchanged.

LONDON.—An increasing volume of inquiry has been received and prices are practically unchanged. Markets continue firm. Prices of coal tar products remain the same as last week.

MANCHESTER.—Although the holiday season is now approaching its end there was still a pronounced absence of buyers on the chemical market on the Manchester Royal Exchange this week, and fresh orders of any consequence were on a strictly moderate scale in the aggregate. There has been a sprinkling of replacement contracts, but otherwise most buyers at the moment appear to be content to operate in comparatively small parcels. On the other hand, a slightly better position has been reported with regard to deliveries against existing commitments and fewer consuming works have been been affected this week by holiday stoppages. The chemical market as a whole keeps steady both for the heavy and the light materials, although there is a certain amount of easiness among some of the by-products and trade conditions are relatively slow.

SCOTLAND.—Business has considerably improved in the Scottish heavy chemical market over the past week, and numerous inquiries have been received for forward business. There have been practically no changes in prices, all of which continue very steady at about previous figures. Lead and zinc products, however, are very firm in sympathy with the metals.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80%, £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech., 80%, £38 5s., d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—Commercial granulated, £25 10s. per ton; crystal, £26 10s.; powdered, £27 10s.; extra finely powdered, £29 10s. packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. SCOTLAND: Crystals, £26 10s.; powder, £27 10s.

ACID, CHROMIC.—10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—11¾d. per lb. MANCHESTER: 11¾d. SCOTLAND: 11¾d.

ACID, CRESYLIC.—97/100%, 1s. 5d. to 1s. 6d. per gal.; 99/100%, refined, 1s. 9d. to 1s. 10d. per gal.

ACID, FORMIC.—LONDON: £40 to £45 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works. SCOTLAND: 80°, £24 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £54 ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. SCOTLAND: 1s. 0¼d. less 5%. MANCHESTER: 1s. 0¾d. per lb.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £34 per ton, c.i.f. U.K ports.

ANTIMONY SULPHIDE.—Golden, 6¼d. to 1s. 3d. per lb.; crimson, 1s. 5½d. to 1s. 7d. per lb., according to quality.

ARSENIC.—IONDON: £16 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £22 to £23, ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—LONDON: £10 10s. per ton. SCOTLAND: £10 10s. to £10 15s.

BARYTES.—£6 10s. to £8 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot, 35/37%, £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 to £9 5s.

BORAX, COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots.

CADMIUM SULPHIDE.—3s. 4d. to 3s. 8d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£31 to £33 per ton, drums extra.

CARBON BLACK.—3¾d. to 4¼d. per lb. LONDON: 4¼d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3¼d. per lb.; liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. LONDON: £3 17s. per cwt. SCOTLAND: £3 16s. 6d. net.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £25 10s. per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resublimed B.P., 6s. 3d. to 8s. 4d. per lb.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £34 10s.; brown, £32 10s.

LEAD NITRATE.—£28 to £29 per ton.

LEAD, RED.—SCOTLAND: £24 to £26 per ton less 2½%; d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £36 10s.

LITHOPONE.—LONDON: 30%, £16 to £17 per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 per ton.

MAGNESIUM SULPHATE.—Commercial, £5 per ton, ex wharf.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—6¾d. to 7½d. per lb. to December 31.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £37.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. less 5%, d/d U.K. Ground, 5½d. LONDON: 5d. per lb. less 5%, with discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100%, powder, £37. MANCHESTER: £37 10s.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM IODIDE.—B.P., 5s. 2d. per lb.

POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¾d. per lb. SCOTLAND: B.P. crystals, 10d. to 10½d. MANCHESTER: B.P., 11¼d. to 1s.

POTASSIUM PRUSSIATE.—LONDON: Yellow, 8¼d. to 8¾d. per lb. SCOTLAND: Yellow spot, 8¼d. ex store. MANCHESTER: Yellow, 8¼d.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels. SCOTLAND: Large crystals, in casks, £36.
SODA ASH.—58% spot, £5 12s. 6d. per ton f.o.r. in bags.
SODA, CAUSTIC.—Solid, 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 12s. 6d. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.
SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.
SODIUM ACETATE.—£21 10s. per ton. LONDON: £22. SCOTLAND: £20 15s.
SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 15s. ex quay or station. MANCHESTER: £10 10s.
SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount 5%. Anhydrous, 5d. per lb. LONDON: 4d. per lot less 5% for spot lots and 4d. per lb. with discounts for contract quantities. MANCHESTER: 4d. per lb. basis. SCOTLAND: 4d. delivered buyer's premises with concession for contracts.
SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.
SODIUM CARBONATE, MONOHYDRATE.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags. Soda crystals, SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality, 7s. 6d. per ton extra. Light Soda Ash, £7 ex quay, min. 4-ton lots with reductions for contracts.
SODIUM CHLORATE.—£32 10s. per ton. SCOTLAND: 3⅝d. per lb.
SODIUM CHROMATE.—4d. per lb. d/d U.K.
SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10 5s.; photographic, £14 10s.
SODIUM META SILICATE.—£14 per ton, d/d U.K. in cwt. bags.
SODIUM IODIDE.—B.P., 6s. per lb.
SODIUM NITRITE.—LONDON: Spot, £18 5s. to £20 5s. per ton d/d station in drums.
SODIUM PERBORATE.—10%, 9¼d. per lb. d/d in 1-cwt. drums. LONDON: 10d. per lb.
SODIUM PHOSPHATE.—£13 per ton.
SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 5d. to 5½d.
SODIUM SILICATE.—140° Tw. Spot, £8 per ton. SCOTLAND: £8 10s.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material, £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 5s.
SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 7s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid, 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 2s. 6d.
SODIUM SULPHITE.—Pea crystals, spot, £13 10s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.
SULPHUR.—£9 10s. to £9 15s. per ton. SCOTLAND: £8 to £9.
SULPHATE OF COPPER.—MANCHESTER: £14 5s. per ton f.o.b.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 4s. 5d. to 4s. 7d. per lb.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 to £9. Grey, £11. Liquor, brown, 30° Tw., 8d. per gal. MANCHESTER: Brown, £9 10s.; grey £12 10s.
ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.
CHARCOAL.—£5 to £10 per ton.
METHYL ACETONE.—46-50%, £43 to £47 per ton.
WOOD CREOSOTE.—Unrefined, 3d. to 1s. 6d. per gal.
WOOD NAPHTHA, MISCIBLE.—2s. 6d. to 3s. 6d. per gal.; solvent, 3s. 3d. to 4s. 3d. per gal.
WOOD TAR.—£2 to £4 per ton.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID NAPHTHIONIC.—1s. 8d. per lb.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100%.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100%, d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
BENZIDINE BASE.—Spot, 2s. 5d. per lb., 100% d/d buyer's works.
BENZIDINE HCL.—2s. 5d. per lb.
p-CRESOL 34-5° C.—1s. 9d. per lb. in ton lots.
m-CRESOL 98/100%.—1s. 11d. per lb. in ton lots.
DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 10½d.
DINITROCHLORBENZENE, SOLID.—£72 per ton.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
β-NAPHTHOL.—Spot, £78 15s. per ton, in paper bags.
α-NAPHTHYLAMINE.—Spot, 11½d. per ton., d/d buyer's works.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works.
o-NITRANILINE.—3s. 11d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb., d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb., d/d buyer's works.
NITROBENZENE.—Spot, 4½d. to 5d. per lb.; 5-cwt. lots, drums extra.
NITRONAPHTHALENE.—9d. per lb.; P.G., 1s. 0½d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—9½d. to 11d. per lb.
p-TOLUIDINE.—1s. 11d. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 6¾d. to 7½d. per lb.; crude, 60's, 1s. 1½d. to 2s. 2½d. per gal. MANCHESTER: Crystals, 6½d. per lb.; crude, 1s. 11d. to 2s. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.
ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale 98%, 1s. 5d. to 1s. 6d.; according to specification. LONDON: 98/100%, 1s. 4d.; dark, 95/97%, 1s. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.
BENZOL.—At works, crude, 9½d. to 10d. per gal.; standard motor 1s. 3d. to 1s. 3½d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 3½d. SCOTLAND: Motor, 1s. 6½d.
CREOSOTE.—B.S.I. Specification standard, 6d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 4½d. f.o.r. North; 5d. London. MANCHESTER: 5¼d. to 5¾d. SCOTLAND: Specification oils, 4d.; washed oil, 4¼d. to 4¾d.; light, 4½d.; heavy, 4¼d. to 4½d.
NAPHTHA.—Solvent, 90/100%, 1s. 5d. to 1s. 6d. per gal.; 95/160%, 1s. 6d.; 99%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4½d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.
NAPHTHALENE.—Purified crystals, £10 per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.
PITCH.—Medium soft, 33s. to 35s. per ton. LONDON: 35s. per ton, f.o.b. East Coast port. MANCHESTER: 30s. to 32s. 6d. f.o.b. East Coast.
PYRIDINE.—90/140%, 5s. 6d. to 8s. per gal.; 90/180, 2s. 3d.
TOLUOL.—90%, 1s. 11d. to 2s. per gal.; pure, 2s. 2d.
XYLOL.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 1d. to 2s. 2d.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Neutral quality basis 20.6% nitrogen £7 5s. per ton, less 9s. per ton for September delivery. This price of £6 16s. delivered to farmer's nearest station in 6-ton lots is the same price as for September, 1934. For delivery later than September no prices have yet been announced.
CALCIUM CYANAMIDE.—For September delivery £6 16s. 3d. per ton delivered in 4-ton lots to farmer's nearest station.
NITRO-CHALK.—The price for the new season has been announced at £7 5s. per ton delivered in 6-ton lots to farmer's nearest station—all terms and conditions the same as for the season 1934/35.
NITRATE OF SODA.—The price for this product for the 1935/36 season has been announced at £7 12s. 6d. per ton delivered in 6-ton lots to farmer's nearest station—all terms and conditions the same as for the season 1934/35.
CONCENTRATED COMPLETE AND NITROGEN PHOSPHATE FERTILISERS.—Up to the present no prices have been announced for the year 1935/36 and the June prices remain in force for prompt delivery.

Latest Oil Prices

LONDON, Aug. 28.—LINSEED OIL was steady. Spot, £24 5s. per ton (small quantities); Sept., £21 15s.; Sept.-Dec., £22; Jan.-April, £22 5s., naked. SOYA BEAN OIL was quiet. Oriental (bulk), Aug.-Sept. shipment, £19 per ton. RAPE OIL was quiet. Crude, extracted, £31 per ton; technical refined, £32 10s., naked, ex wharf. COTTON OIL was steady. Egyptian crude, £24 per ton; refined common edible, £27 10s.; and edodorised, £29 10s., naked, ex mill (small lots, £1 10s. extra). TURPENTINE was dearer. American, spot, 43s. 9d. per cwt.
HULL.—LINSEED OIL.—Spot, quoted £22 12s. 6d. per ton; Aug. and Sept.-Dec., £22 5s.; Jan.-April, £22 5s. COTTON OIL.—Egyptian, crude, spot, £24 per ton; edible, refined, spot, £27; technical, spot, £27; deodorised, £29, naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £18 10s., per ton, naked. GROUNDNUT OIL.—Extracted, spot, £31 10s. per ton; deodorised, £34 10s. RAPE OIL.—Extracted, spot, £30 per ton; refined, £31 10s. SOYA BEAN OIL.—Extracted, spot, £22 10s. per ton; deodorised, £25 10s. COD OIL.—F.o.r. or f.a.s., 25s. per cwt. in barrels. CASTOR OIL.—Pharmaceutical, 42s. per cwt.; first, 37s.; second, 34s. TURPENTINE.—American, spot, 45s. 9d. per cwt.

Chemical and Allied Stocks and Shares

Current Quotations

THE following table shows this week's Stock Exchange quotations of chemical and allied stocks and shares compared with those of last week. Except where otherwise shown the shares are of £1 denomination.

Name.	August 27.	August 20.
Anglo-Iranian Oil Co., Ltd. Ord.	60/-	63/9
,, 8% Cum. Pref.	36/6	36/6
,, 9% Cum. Pref.	38/-	37/9
Associated Dyers and Cleaners, Ltd. Ord.	1/10½	1/10½
,, 6½% Cum. Pref.	5/-	5/-
Associated Portland Cement Manufacturers, Ltd. Ord.	56/6	57/-
,, 5½% Cum. Pref.	27/6	27/6
Benzol & By-Products, Ltd. 6% Cum. Part Pref.	2/6	2/6
Berger (Lewis) & Sons, Ltd. Ord.	65/-	66/9
Bleachers' Association, Ltd. Ord.	6/-	6/7½
,, 5½% Cum. Pref.	10/7½	11/3
Boake, A., Roberts & Co., Ltd. 5% Pref. (Cum.)	21/3	21/3
Boots Pure Drug Co., Ltd. Ord. (5/-)	50/3	50/3
Borax Consolidated, Ltd. Pfd. Ord. (£)	97/6	97/6
,, Defd. Ord.	16/7½	16/10½
,, 5½% Cum. Pref. (£10)	£11/5/-	£11/5/-
,, 4½% Deb. (1st Mort.) Red. (£100)	£109	£109
,, 4½% 2nd Mort. Deb. Red. (£100)	£104	£104
Bradford Dyers' Association, Ltd. Ord.	9/4½	10/-
,, 5% Cum. Pref.	11/10½	13/1½
,, 4% 1st Mort. Perp. Deb. (£100)	£88	£88
British Celanese, Ltd. 7% 1st Cum. Pref.	25/7½	25/9
,, 7½% Part. 2nd Cum. Pref.	20/7½	21/3
British Cotton & Wool Dyers' Association Ltd. Ord. (5/-)	5/3	5/6
,, 4% 1st Mort. Deb. Red. (£100)	£91	£91
British Cyanides Co., Ltd. Ord. (2/-)	3/3	3/3
British Drug Houses, Ltd. Ord.	20/-	20/-
,, 5% Cum. Pref.	22/6	22/6
British Glues and Chemicals, Ltd. Ord. (4/-)	6/-	6/-
,, 8% Pref. (Cum. and Part.)	29/4½	29/4½
British Oil and Cake Mills, Ltd. Cum. Pfd. Ord.	47/10¼	48/9
,, 5½% Cum. Pref.	26/3	26/3
,, 4¼% First Mort. Deb. Red. (£100)	£107/10/-	£107/10/-
British Oxygen Co., Ltd. Ord.	105/-	110/-
,, 6½% Cum. Pref.	32/6	31/10½
British Portland Cement Manufacturers, Ltd. Ord.	97/6	92/6
,, 6% Cum. Pref.	30/-	30/-
Bryant & May, Ltd. Pref.	67/6	67/6
Burt, Boulton & Haywood, Ltd. Ord.	21/3	21/3
,, 7% Cum. Pref.	28/1½	27/6
,, 6% 1st Mort. Deb. Red. (£100)	£105/10/-	£105/10/-
Bush, W. J., & Co., Ltd. 5% Cum. Pref. (£5)	110/-	110/-
,, 4% 1st Mort. Deb. Red. (£100)	£96/10/-	£96/10/-
Calico Printers' Association, Ltd. Ord.	8/9	11/3
,, 5% Pref. (Cum.)	16/3	17/6
Cellulose Acetate Silk Co., Ltd. Ord.	11/3	11/10½
,, Deferred (1/-)	2/4½	2/4½
Consett Iron Co., Ltd. Ord.	9/6	9/9
,, 8% Pref.	27/6	27/6
,, 6% First Deb. stock, Red. (£100)	£107	£107
Cooper, McDougall & Robertson, Ltd. Ord.	36/3	36/3
,, 7% Cum. Pref.	30/-	30/-
Courtaulds, Ltd. Ord.	54/0⅜	55/7½
,, 5% Cum.	26/10½	26/3
Crosfield, Joseph, & Sons, Ltd. 5% Cum. Pre-Pref.	25/-	25/-
,, Cum. 6% Pref.	28/9	28/9
,, 6½% Cum. Pref.	30/-	30/-
,, 7½% "A" Cum. Pref.	31/10½	31/10½
Distillers Co., Ltd. Ord.	93/-	94/-
,, 6% Pref. Stock Cum.	31/-	31/3
Dorman Long & Co., Ltd. Ord.	20/3	21/-
,, Prefd. Ord.	28/1½	29/4½
,, 6½% Non-Cum. 1st Pref.	21/3	22/-
,, 8% Non-Cum. 2nd Pref.	21/3	22/-
,, 4% First Mort. Perp. Deb. (£100)	£102/10/-	£102/10/-
,, 5% 1st Mort. Red. Deb. (£100)	£107	£107
English Velvet & Cord Dyers' Association, Ltd. Ord.	4/4½	4/4½
,, 5% Cum. Pref.	7/6	7/6
,, 4% First Mort. Deb. Red. (£100)	£70	£70
Fison, Packard & Prentice, Ltd. Ord.	38/1½	38/1½
,, 7% Non-Cum. Pref.	31/3	31/3
,, 4½% Debs. (Reg.) Red. (£100)	£106	£106
Gas Light & Coke Co., Ord.	28/-	28/1½
,, 3½% Maximum Stock (£100)	£89/10/-	£89/10/-
,, 4% Consolidated Pref. Stock (£100)	£109/10/-	£109/10/-
,, 3% Consolidated Deb. Stock, Irred. (£100)	£92/10/-	£92/10/-
,, 5% Deb. Stock, Red. (£100)	£116/10/-	£116/10/-
,, 4½% Red. Deb. Stock (1960-65) (£100)	£114/10/-	£114/10/-
Goodlass Wall & Lead Industries, Ltd. Ord. (10/-)	13/6	12/6
,, 7% Prefd. Ord. (10/-)	13/1½	13/1½
,, 7% Cum. Pref.	30/-	30/-
Gossage, William, & Sons, Ltd. 5% 1st Cum. Pref.	24/4½	24/4½
,, 6½% Cum. Pref.	30/-	30/-
Imperial Chemical Industries, Ltd. Ord.	34/9	35/3
,, Deferred (10/-)	8/4⅜	8/7½
,, 7% Cum. Pref.	32/9	33/3
Imperial Smelting Corporation, Ltd. Ord.	14/3	14/6
,, 6½% Pref. (Cum.)	24/1½	24/1½
International Nickel Co. of Canada, Ltd. Cum.	$29¼	$28½
Johnson, Matthey & Co., Ltd. 5% Cum. Pref. (£5)	95/-	95/-
,, 4% Mort. Deb. Red. (£100)	£98/10/-	£98/10/-
Laporte, B., Ltd. Ord.	112/6	115/-
Lawes Chemical Manure Co., Ltd. Ord. (1/-)	8/1½	9/4½
,, 7% Non-Cum. Part Pref. (10/-)	10/-	10/-
Lever Bros. Ltd. 7% Cum. Pref.	30/9	31/9
,, 8% Cum. "A" Pref.	32/6	32/6
,, 20% Cum. Prefd. Ord.	76/10½	78/1½
,, 5% Cons. Deb. (£100)	£109	£109
,, 4% Cons. Deb. (£100)	£105	£105
Magadi Soda Co., Ltd. 12½% Pref. Ord. (5/-)	1/3	1/3
,, 6% 2nd Pref. (5/-)	6d.	6d.
,, 6% 1st Debs. (Reg.)	£58	£58
Major & Co., Ltd. Ord. (5/-)	7½d.	7½d.
,, 8% Part. Prefd. Ord. (10/-)	9d.	9d.
,, 7½% Cum. Pref.	1/10½	1/6¾
Pinchin, Johnson & Co., Ltd. Ord. (10/-)	40/6	42/-
,, 1st Pref. 6½% Cum.	33/1½	33/1½
Potash Syndicate of Germany (Deutsches Kalisyndikat G.m.b.H.) 7% Gld. Ln. Sr. "A" and "B" Rd.	£67	£67
Reckitt & Sons, Ltd. Ord.	114/4½	115/-
,, 4½% Cum. 1st Pref.	25/-	25/-
Salt Union, Ltd. Ord.	45/-	45/-
,, Pref.	46/3	46/3
,, 4½ Deb. (£100)	£109	£109/10/-
South Metropolitan Gas Co. Ord. (£100)	£133/10/-	£133/10/-
,, 6% Irred. Pref. (£100)	£149/10/-	£149/10/-
,, 4% Pref. (Irred.) (£100)	£108/10/-	£108/10/-
,, Perpetual 3% Deb (£100)	£89/10/-	£89/10/-
,, 5% Red. Deb. 1950-60 (£100)	£114/10/-	£114/10/-
Staveley Coal & Iron Co., Ltd. Ord.		46/3
Stevenson & Howell, Ltd. 6½% Cum. Pref.	26/3	26/3
Triplex Safety Glass Co., Ltd. Ord. (10/-)	71/3	76/3
Unilever, Ltd. Ord.	30/7½	30/-
,, 7% Cum. Pref.	29/9	29/9
United Glass Bottle Manufacturers, Ltd. Ord.	41/-	42/-
,, 7½% Cum. Pref.	33/-	33/-
United Molasses Co., Ltd. Ord. (6/8)	18/9	20/-
,, 6% Cum. Pref.	23/9	23/9
United Premier Oil & Cake Co., Ltd. Ord. (5/-)	7/-	7/3
,, 7% Cum. Pref.	23/9	23/9
,, 6% Deb. Red. (£100)	£101	£101

Inventions in the Chemical Industry

Patent Specifications and Applications

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Complete Specifications Open to Public Inspection

DI-CALCIUM PHOSPHATE or mixed fertilisers containing the same, production.—Kali-Forschungs-Anstalt Ges. Feb. 14, 1934. 2251/35.

WATER-INSOLUBLE AZO DYESTUFFS on cellulosic fibres, manufacture.—I. G. Farbenindustrie. Feb. 15, 1934. 4798/35.

DYESTUFFS OF THE DIOXAZINE SERIES, manufacture.—I. G. Farbenindustrie. Feb. 15, 1934. 4928/35.

ARSENATE ALUMINATE CEMENT and method for the production thereof.—Bolidens Gruvaktiebolag. Feb. 19, 1934. 5116/35.

VAPORISING SULPHUR, method and apparatus.—E. F. Guba. Feb. 19, 1934. 5233/35.

SULPHUR COMPOUNDS, manufacture.—I. G. Farbenindustrie. Feb. 17, 1934. 5235/35.

CAUSTIC SODA SOLUTIONS, purification.—Pennyslvania Salt Manufacturing Co. Feb. 17, 1934. 5252/35.

Specifications Accepted with Date of Application

SYNTHETIC RESINS and method of production thereof.—E. I. du Pont de Nemours and Co. Jan. 13, 1933. 433,452.

METALLIFEROUS AZO DYESTUFFS.—Imperial Chemical Industries, Ltd., and M. Mendoza. Jan. 12, 1934. 433,454.

UREA-FORMALDEHYDE CONDENSATION PRODUCTS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Feb. 12, 1934. 433,536.

CONDENSATION PRODUCTS of phenols and formaldehyde, manufacture.—A. A. Drummond, H. H. Morgan, and Imperial Chemical Industries, Ltd. Feb. 12, 1934. 433,539.

PROCESS FOR THE MANUFACTURE of a material comprising a polymeride in sheet form.—H. J. Tattersall and Imperial Chemical Industries, Ltd. Feb. 12, 1934. 433,540.

ALKYL SULPHONIC ACIDS, manufacture.—Imperial Chemical Industries, Ltd., and A. Davidson. Feb. 13, 1934. 433,312.

CHLORINATED RUBBER, manufacture.—T. N. Montgomery and Imperial Chemical Industries, Ltd. Feb. 13, 1934. 433,313.

AQUEOUS SOLUTIONS CONTAINING HYDROGEN PEROXIDE, stabilisation.—E. I. du Pont de Nemours and Co., H. N. Gilbert and J. Reichert. Feb. 15, 1934. 433,470.

PROCESS FOR REDUCING FATTY ACIDS and esters thereof.—Imperial Chemical Industries, Ltd., and S. J. Green. Feb. 16, 1934. 433,549.

BITUMINOUS DISPERSIONS, manufacture.—W. W. Groves (I. G. Farbenindustrie). Feb. 16, 1934. 433,550.

AMINOALKYLATED AMINES, manufacture.—A. Carpmael (I. G. Farbenindustrie). Feb. 17, 1934. 433,625.

CYCLIC ESTERS, manufacture.—E. I. du Pont de Nemours and Co. Feb. 18, 1933. 433,632.

ELECTROLYTIC PRODUCTION OF SODIUM and other light metals.—E. I. du Pont de Nemours and Co. Feb. 17, 1933. 433,633.

PRODUCTION OF FORMALDEHYDE from methane.—W. W. Triggs (Gutchoffnungshütte Oberhausen A.-G.). March 20, 1934. 433,559.

CELLULOSE ARALKYL ETHERS, purification.—D. Traill and Imperial Chemical Industries, Ltd. May 28, 1934. 433,397.

PROCESS OF REMOVING HYDROCYANIC ACID from mixtures containing the same.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. June 28, 1933. 433,398.

CARBAZOLE DERIVATIVES, manufacture.—Soc. of Chemical Industry in Basle. July 20, 1933. 433,574.

ARTIFICIAL RESINS, production.—H. D. Elkington (A. Nowack A.-G., Dr. R. Hessen, and Dr. K. A. Schuch). Aug. 17, 1934. 433,666.

MINERAL OILS, apparatus for refining.—Aktiebolaget Separator-Nobel. Oct. 6, 1933. 433,584.

ELECTROLYSIS FURNACES for the production of aluminium.—Siemens-Planiawerke A.-G. für Kohlefabrikate. Oct. 24, 1933. 433,508.

METHOD OF OBTAINING PHOTOGRAPHIC CONTRASTS by means of naphthalene diazonium compounds.—Naamlooze Vennootschap Philips' Gloeilampenfabriken. Dec. 27, 1933. 433,586.

QUATERNARY AMMONIUM SALTS, manufacture.—Deutsche Hydrierwerke A.-G. Nov. 18, 1933. 433,356.

PRODUCTION OF VALUABLE LIQUID HYDROCARBONS by the heat treatment of liquid hydrocarbons containing unsaturated compounds or resins or asphalts in the presence of hydrogenating gases.—International Hydrogenation Patents Co., Ltd. Jan. 18, 1934. (Addition to 1373/34.) 433,593.

PROCESS FOR TRANSFORMING MIXTURES of alcohols and fatty or aromatic hydrocarbons into highly anti-knock economical fuels for internal-combustion engines.—Soc. Anon. Carburanti Italia, and E. Livraghi. Dec. 4, 1933. 433,410.

ACCELERATED PRELIMINARY MATURING of alkali-cellulose.—O. Kohorn (trading as O. Kohorn and Co. Maschinenefabrik) and R. Brandes. Jan. 23, 1934. 433,414.

Applications for Patents

(August 1 to 7 inclusive.)

VAT DYESTUFFS, manufacture.—G. W. Johnson (I. G. Farbenindustrie). 22195.

HALOGENATED CARBOXYLIC ACID ESTERS, manufacture.—G. W. Johnson (I. G. Farbenindustrie). 22281.

APPARATUS FOR COMBUSTION OF SULPHUR.—G. W. Johnson (I. G. Farbenindustrie). 22326.

APPARATUS FOR DRYING CHINC CLAY.—F. Lobb. 21825.

ALKYL PHENOLS, ETC., manufacture.—G. T. Morgan. 21920

BASES FROM α-AMINOPYRIDINE, manufacture.—G. T. Morgan. 22125.

HYDROCARBONS RICH IN HYDROGEN, production.—H. E. Potts (International Hydrogenation Patents Co.) 21800.

TREATMENT OF CARBONACEOUS INITIAL MATERIALS WITH HYDROGENATING GASES.—H. E. Potts (International Hydrogenation Patents Co.). 21801.

WATER-SOLUBLE COLLOIDAL MOLYBDENUM, producing.—P. R. Vessie. 21979.

(August 8 to 14 inclusive.)

CALCIUM CYANIMIDE, manufacture.—Akt. Ges., für Stickstoffdünger. (Germany, Aug. 14, '34.) 22910.

EMULSIFICATION OF TARS.—E. Arnold. 22589.

SEPARATION OF COAL.—Birtley Co., Ltd. 22834.

RESIN-FIBRE PRODUCTS.—Bakelite, Ltd. (United States, Aug. 22, '34.) 22899, 22900.

CELLULOSE ESTERS, ETC., dyeing.—H. Blackshaw, 22892.

LIQUID FUELS.—W. A. Bristow. 22624.

PRESERVATION OF FOODSTUFFS, ETC.—M. Bywater & Co., Ltd. 22410.

WATER, purification.—F. P. Candy. 22852.

HYDROXYCARBOXYLIC ACIDS, manufacture.—A. Carpmael (I. G. Farbenindustrie). 22421.

ACETYLENE, manufacture of addition products of.—A. Carpmael (I. G. Farbenindustrie). 22538.

SULPHURIC ACID, manufacture of products containing.—A. Chwala. (Austria, Aug. 10, '34.) 22513.

ALKALINE CYANIDE SOLUTIONS, treatment.—T. B. Crowe, 22633.

HYDROGENATION, ETC., of raw aromatic hydrocarbons.—F. B. Dehn., (Deutsche Hydrierwerke Akt.-Ges.). 22698.

MANUFACTURE OF PHOTOGRAPHIC SILVER HALIDE EMULSIONS.—W. W. Groves (I. G. Farbenindustrie). 22676.

JOINING INORGANIC AND METALLIC ELEMENTS.—H. Handrek, (Germany, Aug. 13, 34.) 22830.

PRODUCTION OF DARK ELECTROLYTIC DEPOSITS OF RHODIUM.—W. C. Heraeus Ges. (Germany, June 4.) 22607.

HIGHLY CONCENTRATED NITRIC ACID, manufacture.—T. Hobler. (Germany, Aug. 13, '34.) 22805.

CHLORIDES OF POLYCARBOXYLIC ACIDS, manufacture.—G W. Johnson. (I. G. Farbenindustrie). 22648.

LEAD-TELLURIUM ALLOYS, production.—Kabul-und Metallwerke Neumeyer Akt.-Ges. 22601.

PREPARATION OF DERIVATIVES OF PYRIDINE AND QUINOLINE.—Kodak Ltd. (United States, Aug. 9, '34.) 22537.

VINYL RESINS, manufacture.—H. E. Potts (Shawinigan Chemicals, Ltd.). 22642.

(August 15 to 21 inclusive.)

CALCIUM ALUMINATE, etc., production.—Aktieselskapet Norsk Aluminium Co. (Norway, Aug. 30, '34.) 23414.

SEPARATION OF LIQUIDS.—E. S. Andrews (Sims). 23469.

GAS-PURIFYING APPARATUS.—Babcock and Wilcox, Ltd. (United States, Feb. 19.) 23087.

AIR-GAS MIXING GENERATOR.—A. Berning. (Germany, Aug. 20, '34.) 23317.

REFINING OF MINERAL OILS.—S. S. Bhatnagar and Steel Bros. and Co., Ltd. 23257.

DYESTUFFS, manufacture.—A. G. Bloxam (Sec. of Chemical Industry in Basle). 23364.

CARRYING OUT CHEMICAL REACTIONS in the liquid phase.—W. A. Bone. 23268.

INSECTICIDAL MATERIALS, manufacture.—E. W. Bousquet. 23269.

HALOGENATED MIXED ETHERS, manufacture.—British Thomson-Houston Co., Ltd. (United States, Aug. 23, '34.) 23493.

THERMO-PLASTIC COMPOUNDS.—E. J. Brock. 23351.

AZO DYESTUFFS insoluble in water, manufacture.—A. Carpmael (I. G. Farbenindustrie.) 23277.

AMIDE-LIKE HALOGENATED CONDENSATION PRODUCTS, manufacture. A. Carpmael (I. G. Farbenindustrie). 23380.

EXPLOSIVES, production.—B. Parodi-Delfino. (Italy, Aug. 18, '34.) 23083.

ACETYLATED ALKYLTRIMETHYLOLMETHANES, production. — B. Parodi-Delfino. (Italy, Aug. 17, '34.) 23186.

DISPERSIONS OF HALOGENOBUTACIENES, production.—E. I. du Pont de Nemours and Co. (United States, Aug. 23, '34.) 23002.

CELLULOSE ESTERS, production.—E. I. du Pont de Nemours and Co. (United States, Aug. 16, '34.) 23101.

OILS RICH IN VITAMINS, production.—E. W. Fawcett. 23271.

SULPHIDES, manufacture.—W. W. Groves (I. G. Farbenindustrie). 23256.

ANTHRAQUINONE DYESTUFFS.—R. N. Heslop, Imperial Chemical Industries, Ltd., and W. W. Tatum. 23270.

AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. (Germany, Aug. 16, '34.) 22987.

METALS BY ELECTROLYSIS, production.—S. H. Lundberg. (Sweden, July 6.) 23521.

MANURES, manufacture.—F. A. Nuske. 22972.

THERMAL TREATMENT OF CARBONACEOUS MATERIAL, apparatus.—Physical Chemistry Research Co. (France, Feb. 21.) 23240.

NEW OXYKETONES and esters thereof, manufacture.—Soc. of Chemical Industry in Basle. (Switzerland, June 18). 23259.

From Week to Week

THE INSTITUTE OF CHEMISTRY has just published in attractive booklet form the report of its Charter Jubilee. The celebrations took place at the Dorchester Hotel on July 9 and 10.

AFTER SIXTY-SIX YEARS TRADING in the City of London, Honeywill and Stein, Ltd., have removed from London House, 3 New London Street, to York House, 15 Regent Street, S.W.1. Telephone Nos. Whitehall 8021 (6 lines).

THE LONDON SHELLAC RESEARCH BUREAU is issuing a series of abstracts bearing on shallac research literature. The abstracts are being published twice a year and contain, in a potted form, all the information concerning the behaviour and properties of shallac.

WITH REFERENCE TO A NOTICE in the "Board of Trade Journal" of January 10 last regarding the import of white spirit into France, it should be noted that a recent decree fixes the quantity of white spirit which may be imported during the whole of 1935 at 12,000 metric tons.

THE CUSTOMS DUTY ON PARAFFIN WAX used in the waterproofing of paper containers for milk is to be reduced, states a decree published in the French "Journal Officiel" of August 11. The reductions are from 213.20 to 109.20 frs. per 100 kilogs. when imported direct, and from 174.05 to 70.10 frs. per 100 kilogs. when introduced from factories under Customs control. The duties on paraffin wax for other uses are unchanged.

UNITED KINGDOM OUTPUT of transparent cellulose wrapping during the first half of 1935 is estimated at 30,330 cwt., against 22,450 cwt. in the corresponding period in 1934. The chief producers are Courtaulds, Ltd., and this firm is constructing a large new factory at Bridgewater, Somerset. When the latter is in operation it will account for a much larger proportion of the output of the country. Other producers include Transparent Paper, Ltd., British "New-Wrap" Co., Ltd., and British Sidac, Ltd.

MR. W. G. BURNS, M.A., M.B. (chairman), presiding at the annual meeting of Solidol Chemical, Ltd., on August 21, said he had mentioned last year that they looked upon the then current year as being the deciding period of the company's existence. They had to face the fact to-day that, with all their efforts, with the most stringent economy, and while endeavouring to the utmost of their ability to push their goods, they had again not been able to show a profit. He felt he could not usefully add more at that juncture except that they might possibly come through by carrying on.

THE TOTAL IMPORTS OF CHEMICALS, drugs and medicines into Sind in the year 1934-35 amounted to £375,000, showing an improvement of £22,500 over the previous year. The improvement occurred mainly under sodium carbonate from the Unitel Kingdom and other sources and medicines from the United Kingdom and Germany. The imports of dyes and colour were valued at £195,500, an increase of £37,500, which was most noticeable in receipts of alizarine and other coal tar dyes from Germany intended mostly for upcountry woollen mills. Imports of glass and earthenware appreciated by £15,000 to £135,000. There was also an increase in the imports of paper amounting to £30,000. Imports of cement, however, dropped from 7,108 tons to 2,900 tons, the reduction occurring mainly in imports from Japan.

THE L.N.E.R. IS INSTALLING 22 water softening plants at various points on its system. Work is progressing so satisfactorily that certain of these appliances are already in operation and others are to be brought into use almost immediately. Thirteen of the plants are being located between Kings Cross and Doncaster, and nine sites have been chosen for the remainder on the Great Eastern Section. The object is to ensure a supply of pure water to the locomotive boilers, and thereby obviate the deposit of scale similar to the "fur" deposited in the domestic kettle when hard water is used. Many travellers on the line have recently noticed the round metallic towers which are appearing at various points and have wondered what they are. These are the storage containers in which the softening apparatus is housed.

L. LIGHT AND CO., of 12 Gray's Inn Road, Holborn, have just issued a new price list of fine chemicals. The new list has been made more attractive by giving some of the properties of the compounds catalogued.

TEN THOUSAND BARRELS OF OIL, valued at £20,000, were saved when fire broke out in the Dronfield works of R. D. Nicol and Co. The blaze was started by the sun shining through glass windows on to some grass. The fire brigade extinguished the flames with the help of a new foam extinguisher.

THE CHICAGO MEDICAL PRESS has just issued a "Review of the Pneumonokonioses (Silicosis)—Literature and Laws of 1934." It contains all the international abstracts, extracts and reviews of the 1934 literature of the pneumonokomioses and their allied disease and subjects plus all the 1934 bibliography.

THE COPPER DEVELOPMENT ASSOCIATION is issuing a series of pamphlets about copper for the use of engineers. They contain a selection from the very large amount of information available, given in the form of an engineer's note book, and are intended to act as general guides in connection with applications of the metal copper.

THE NORMAN LOCKYER Lecture of the British Science Guild will be given by Sir Josiah Stamp, on November 13, at 4.30 p.m. The lecture will take place in the Goldsmiths' Hall, which the Goldsmiths' Company have again lent to the Guild for this purpose. Lord Melchett, president of the Guild, will take the chair.

THE WANDSWORTH TECHNICAL INSTITUTE commences its evening classes on September 16. Two new sections have been added to the syllabus:—(i) Markets; Sales Organisation; Salesmanship. (ii) Development; Executive; and General Classes. Sir Francis Goodenough, C.B.E., will lecture on "The Selling Side of Business" on October 8 at the Institute.

THE ARTICLE on "Chemical Stoneware: Old and New," by Dr. Felix Singer, which appeared in THE CHEMICAL AGE of June 29, has been reprinted in an extended form, with additional information of interest to users of chemical stoneware. Copies may be had, free of charge and post free, on application to the Editor, THE CHEMICAL AGE, Bouverie House, 154 Fleet Street, E.C.4.

THE TREASURY HAS MADE AN ORDER under Section 10 (5) of the Finance Act, 1926, exempting the following articles from Key Industry Duty as from August 26 until October 31. Physical lecture and experimental apparatus of the following descriptions: Glass observation portions of a fractionating column, glass bubble caps, metal bubble caps, and level control devices, being parts of apparatus to demonstrate fractional distillation. The Treasury Order will shortly be published by H.M. Stationery Office.

IT IS proposed to merge into one concern all the cement companies operating in India, in the interests both of the manufacturers and consumers. The amalgamation will take place before the end of the year, and the proposed corporation will have a capital of several crores, plus a directorate composed of experienced business men. As is well known, during the last few years the cement industry in India has taken a definite step forward in better organisation and marketing and in future the greater use of cement is anticipated owing to the increasing building activity in India.

A STRIKE affecting over 4,000 employees at two factories of Courtaulds, Ltd., at Flint, began on August 22 and ended on Monday. The trouble started when the afternoon spinning shift at Aber Works, comprising 120 men, refused to work because, they alleged, a junior charge hand had been given a temporary post as foreman while a senior charge hand had been passed over. Negotiations were opened but a deadlock ensued and by the morning of August 23 all the spinners at both the Aber and Castle Works were out, and as the artificial silk industry could not continue without the spinners the employees in other departments, including a large number of girls, had to cease work. On Monday a director expressed his willingness to meet the union leaders, and at the conference details of a settlement were arrived at.

AN IMPORTANT NEW FEATURE appears on the Automobile Association's revised London route map which is now available to members. Suburban railway stations are specially indicated near which suitable garage accommodation is available or at which all-day car parks are to be found. The principal purpose of the map is to indicate the main exits from London and other recommended routes to coastal towns and important centres in the home counties. A service of London pilots is maintained by the Association for the convenience of members who are unfamiliar with the Metropolis or nervous of the heavy traffic. Pilots meet members on the outskirts of London and drive them or direct them to their destination. The London route map may be obtained gratis on application to the A.A., Fanum House, New Coventry Street, W.1, or any A.A. branch office.

CLAY WORKERS IN THE NEWTON ABBOT area are considering the question of a stoppage of work if the employers refuse to concede the 10 per cent. wages cut made in 1933. A mass meeting of the men employed with the seven firms involved has been held, and the following resolution has been unanimously passed: "That this meeting of clay workers emphatically protests against the refusal of the seven firms to consider our application, and we further instruct our district officer to make an application for an interview with the firms concerned, accompanied by a deputation of the men, and failing the interview being granted, we instruct him to report matters to the London District Committee of the National Union of General and Municipal Workers and request that permission be granted for a ballot vote of the members to be taken on the question, of a stoppage of work to enforce our terms."

New Companies Registered

D.A.A. Products, Ltd., 73 Priory Road, N.W.6.—Registered August 24. Nominal capital £1,000. Chemists, druggists, drysalters, oil and colourmen, distillers, manufacturers of and dealers in alcohol, extracts, essences, essential oils, spices, herbs, perfumes, dyes, soaps, patent medicines and toilet preparations, etc. Directors: Daniel Devon, Bernard Levene.

Distributors (Newcastle-upon-Tyne), Ltd., 34 Market Street, Newcastle-on-Tyne.—Registered August 19. Nominal capital £1,000. Manufacturers, merchants and brokers of and agents for the purchase and sale of special protective paints, quick-drying anti-corrosive enamels, paints, colours, varnishes, antifouling compositions, bituminous paints, etc. Director: Frank Milburn.

Eureka Scientific Co., Ltd., 209 Henley Road, Ilford.—Registered August 23. Nominal capital £2,000. Chemical, physical and scientific apparatus and chemical merchants and dealers, etc. Directors: Robt. G. W. Conner, Geo. W. J. Joyce, Geo. J. Sexton.

Non-Krode Deposits, Ltd., 71 Temple Row, Birmingham.—Registered August 19. Nominal capital £200. To acquire and exploit a process of rust proofing and metal deposition known as the Non-Krode Process discovered by H. Webb and W. H. Deeley, and to carry on the business of electro, nickel and chromium platers, bronzers, oxidisers and metal platers and polishers, chemical engineers, manufacturers of and dealers in chemicals, etc. Directors: Henry Webb, William H. Deeley, Edward H. Kenshole.

The Sturtevant Mill Company of U.S.A., Ltd., 13 Bedford Row, W.C.1.—Registered August 22. Nominal capital £100. Manufacturers and dealers in boilers, turbines, winding engines, haulage plant, dynamos, motors, electrical plant, crushing, grinding, screening, air separating and compressing, and pulping plant and machinery, machinery for chemical industries, etc. Directors: Lawrance H. Sturtevant (President and general manager of Sturtevant Hill Co., Boston), Thomas J. Sturtevant, Frederick W. R. Williams, Henry N. Oswald.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

British India.—H.M. Trade Commissioner at Calcutta reports that the Indian Stores Department is calling for tenders, to be presented in Simla by September 7, 1935, for the supply of an oil-fired normalising furnace. (Ref. T.Y. 5211.)

Holland.—An agent established at Amsterdam wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of aluminium powder (for painting). (Ref. No. 202.)

Egypt.—The Acting Commercial Secretary to the Residency, Egypt, reports that the Department of Public Health, Cairo, is calling for tenders, to be presented in Cairo by October 7, 1935, for the supply of X-ray apparatus, X-ray table, short-wave diathermy apparatus, etc. (Ref. T.Y. 10063.)

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

MIXTROL OIL PRODUCTS OF GREAT BRITAIN, LTD. London, W. (M., 31/8/35.) Reg. Aug. 19, £1,000 deb., to A. E. Greenacre, 276 Green Lane, Norbury; general charge. *——. Jan. 14, 1935.

SHIP CARBON CO. OF GREAT BRITAIN, LTD., London, E.C. (M., 31/8/35.) Reg. Aug. 12, £7,000 charge (sec. 81, 1929 Act), to Gwendolen Cleaver, 1 Rue du Cardinal-Lemoine, Paris; charged on lands at Goodmayes.

SUNLIGHT DYE WORKS AND LAUNDRY, LTD., Southampton. (M., 31/8/35.) Reg. Aug. 14, £6,000 debs.; general charge. *£2,400. Nov. 13, 1934.

County Court Judgments

(NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court Judgments against him.)

ASPREES LABORATORIES CO., LTD., Boundary House, Turnford, manufacturing chemists. (C.C., 31/8/35.) £10 8s. 4d. May 21.

Company News

Canadian Industries.—Payment of 1¾ per cent. on 7 per cent. cumulative preferred stock for the quarter ending September 30, 1935 is announced, payable on Octo'ber 15.

United Indigo and Chemical Co.—A dividend on the ordinary shares of 5 per cent., less tax, is announced. This is the same as that paid for the past two years. For the two previous years no distribution was made.

Boots Pure Drug, Ltd.—The directors have declared the usual quarterly dividend of 6 per cent., less tax, on the £1,600,000 ordinary capital, payable on September 30. The ordinary dividend has been maintained at 24 per cent., less tax, together with a bonus of 5 per cent., tax free, for some years.

Pinchin Johnson and Co.—The ordinary interim dividend is being maintained at 7½ per cent., less tax, payable on September 17. For 1934 the final dividend was 10 per cent., making a total distribution of 17½ per cent. for the year, against 15 per cent. for the previous two years.

Triplex Safety Glass Co.—For the year to June 30 last, a dividend of 30 per cent., less tax, is announced. This compares with 25 per cent. paid for the previous two years. On account of 1930-31 and 1931-32 10 per cent. was distributed. The net profit for 1933-4 was £75,170 and 48½ per cent. was earned on the shares.

North Broken Hill, Ltd.—A dividend of 12½ per cent. and a bonus of 5 per cent., making 17½ per cent. per share, have been declared. This compares with a dividend of 7½ per cent. and a 5 per cent. bonus for the corresponding period last year. Distributions for the year ended June 30 last amounted to 40 per cent., compared with 27½ per cent. the previous year.

"C.A." Query

Readers are invited to co-operate in supplying information on the subjects raised under this heading. Replies should be addressed to the Editor, THE CHEMICAL AGE, quoting the reference number.

844—FRENCH CREAM GUM.—Could you give us the names and addresses of any manufacturers of this product? Also any information concerning the substance itself.

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